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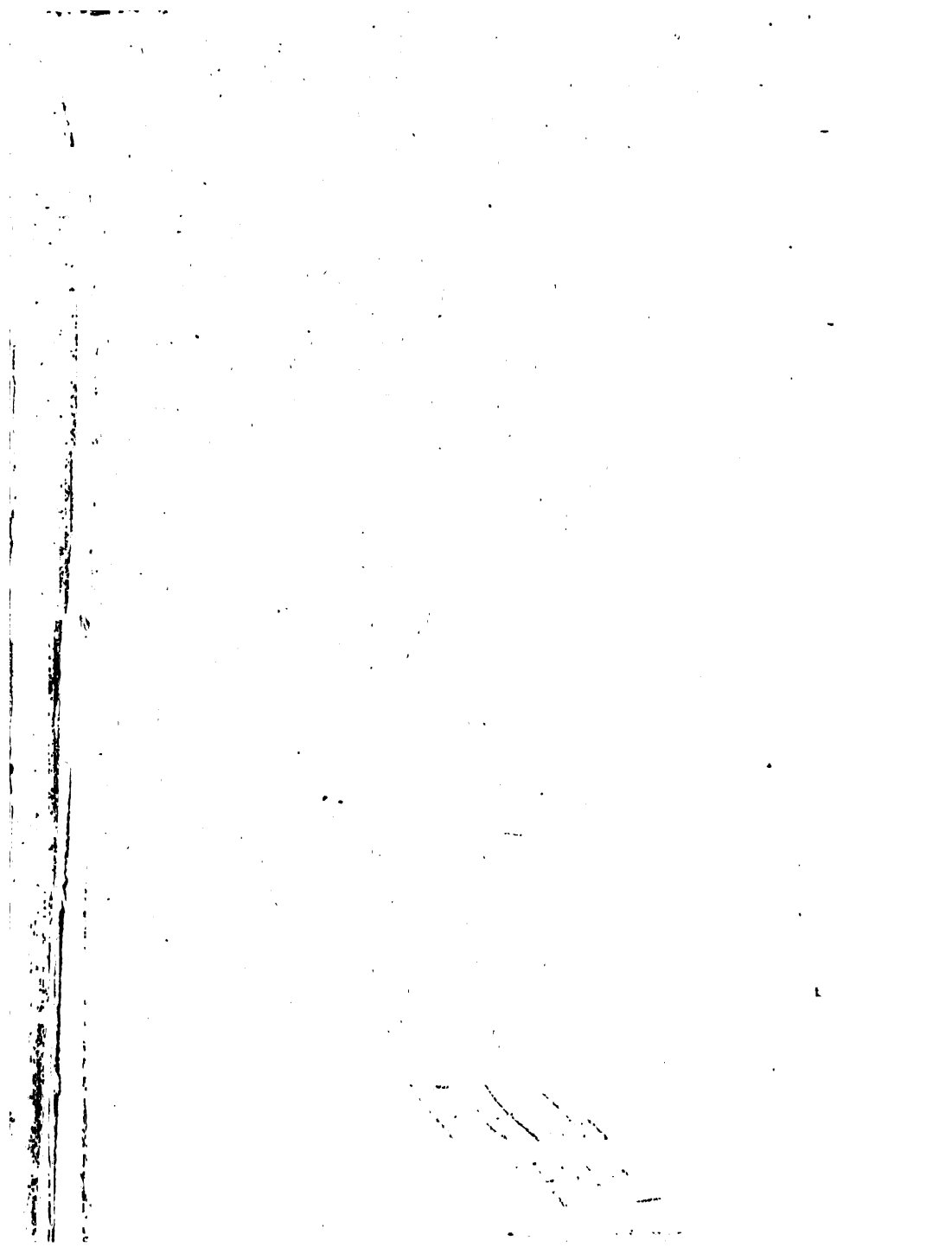
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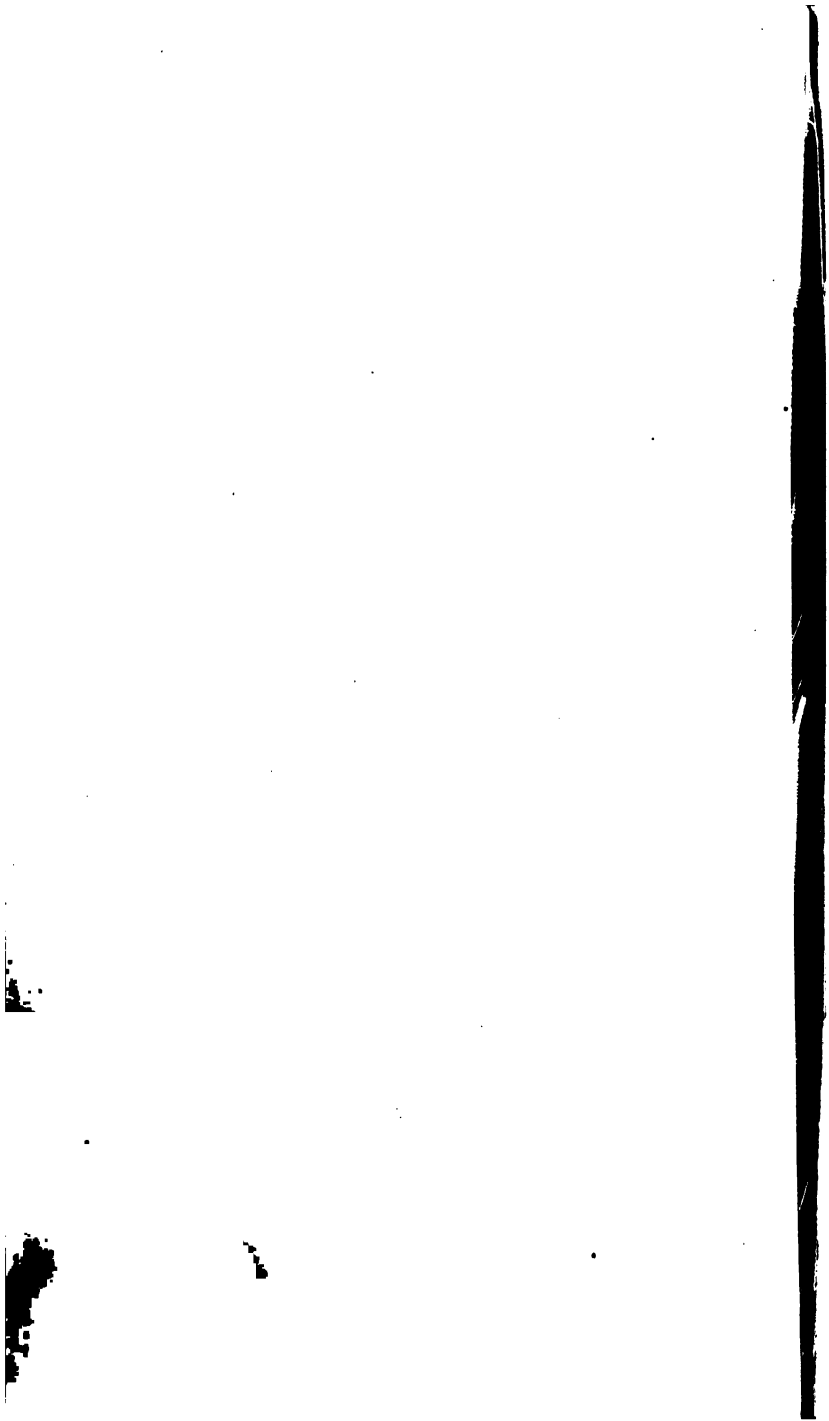


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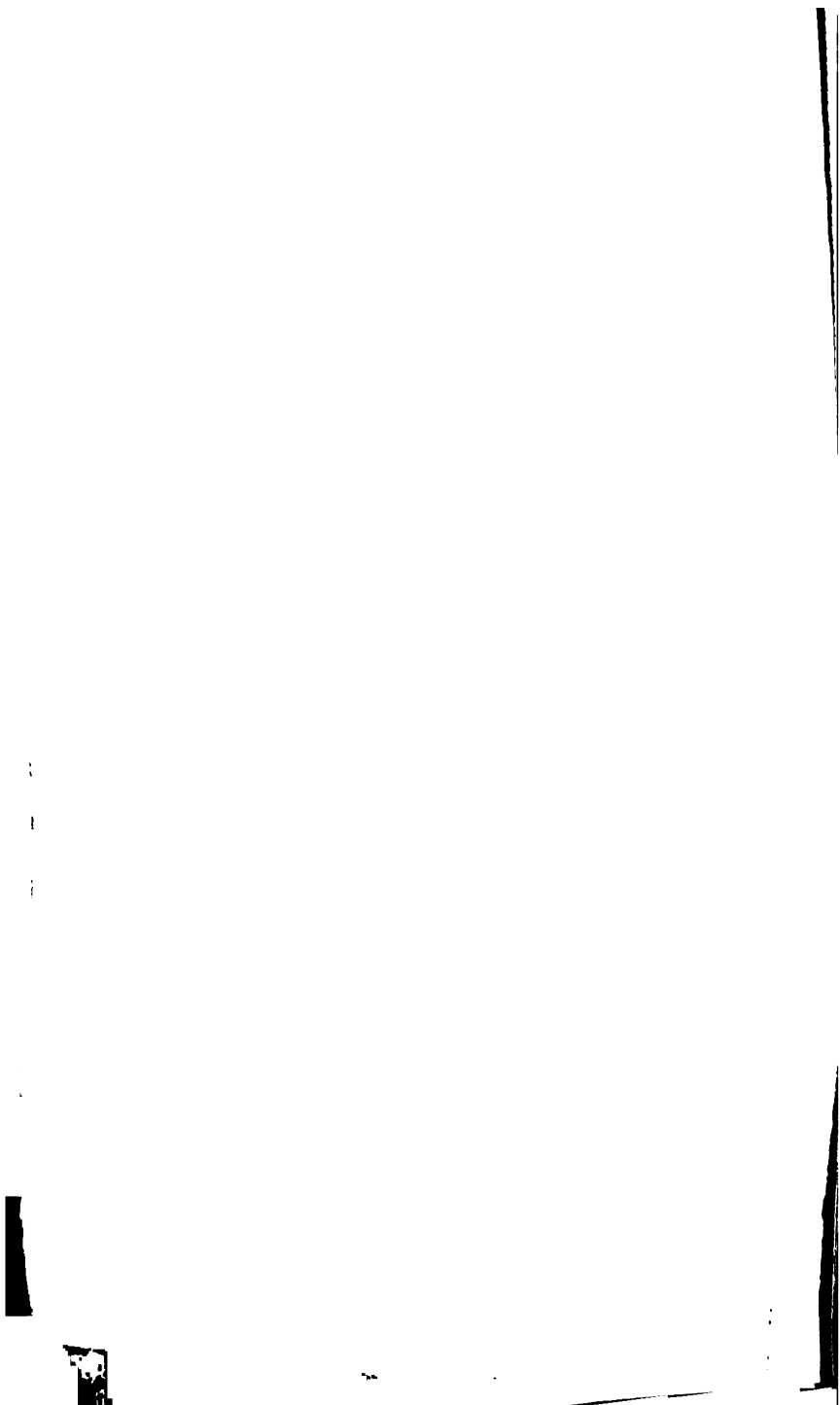
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OUTLINES
OF
PHYSICAL GEOGRAPHY

BY
GEORGE W. FITCH.

ILLUSTRATED WITH
Six Maps and Numerous Engravings.

"Let me once understand the real geography of a country,—its organic structure, if I may so call it; the form of its skeleton,—that is, of its hills; the magnitude and course of its veins and arteries,—that is, of its streams and rivers; let me conceive of it as a whole, made up of connected parts; and then the position of man's dwellings, viewed in reference to these parts, becomes at once easily remembered, and lively and intelligible besides."

DR. ARNOLD.

REVISED, WITH NOTES, ALTERATIONS, AND ADDITIONS,

BY
ALPHONSO J. ROBINSON.

TENTH LARGE EDITION.

NEW YORK:
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No. 321 BROADWAY.

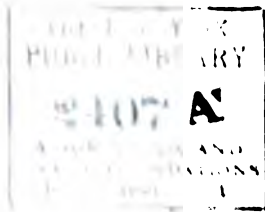
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NEWBURG, N. Y.: T. S. QUACKENBUSH.

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REGISTERED ACCORDING TO ACT OF CONGRESS, IN THE YEAR 1855, BY
J. H. VORTMAN & CO. AND G. W. FITCH,
IN THE CLERK'S OFFICE OF THE DISTRICT COURT OF THE UNITED STATES FOR
THE SOUTHERN DISTRICT OF NEW YORK

REGISTERED ACCORDING TO ACT OF CONGRESS, IN THE YEAR 1858, BY
J. H. COLTON,
IN THE CLERK'S OFFICE OF THE DISTRICT COURT OF THE UNITED STATES FOR
THE SOUTHERN DISTRICT OF NEW YORK.

DAVIES AND ROBERTS,
ELECTROTYPERS.

GEORGE RUSSELL & CO.,
PRINTERS.

P R E F A C E.

THE following pages have been prepared with the view of supplying the want of a treatise on Physical Geography, adapted to the use of Schools and Academies. It is rather a remarkable fact, that among the multitude and variety of school-books prepared for the schools in the United States, there is not one devoted exclusively to this science. The consequence is, that Physical Geography, as a separate study, is very rarely taught in our schools, and that all, or most of the knowledge acquired respecting it, is what is incidentally obtained in pursuing other kindred studies.

The Author has aimed to present none but well-authenticated facts, and accordingly he has consulted the latest and most reliable authorities. Among the works from which valuable information has been obtained are "LYELL'S PRINCIPLES OF GEOLOGY," "MILNER'S GALLERY OF NATURE," "MILNER'S GEOGRAPHY," "KEMTZ'S METEOROLOGY," "HUGHES' OUTLINES OF GEOGRAPHY," and "SOMERVILLE'S PHYSICAL GEOGRAPHY." In this connection, the Author would acknowledge his great obligation to Lieut. M. F. Maury, Superintendent of the National Observatory, Washington, for very valuable information on the recent deep-sea soundings which he has caused to be made in the Atlantic Ocean. From Maury's "SAILING DIRECTIONS" many interesting facts have been gleaned respecting the winds and currents of the ocean, trade routes, etc. To A D Bache, Superintendent of the United States Coast Survey, the Author is indebted for various Reports of the operations of that department, and for a Tide Table of the United States which was specially prepared for this book.

The maps were compiled with the greatest care by Mr. George W. Colton, the aim being to exhibit the most remarkable and interesting features of Physical Geography, as far as they are capable of being represented to the eye.



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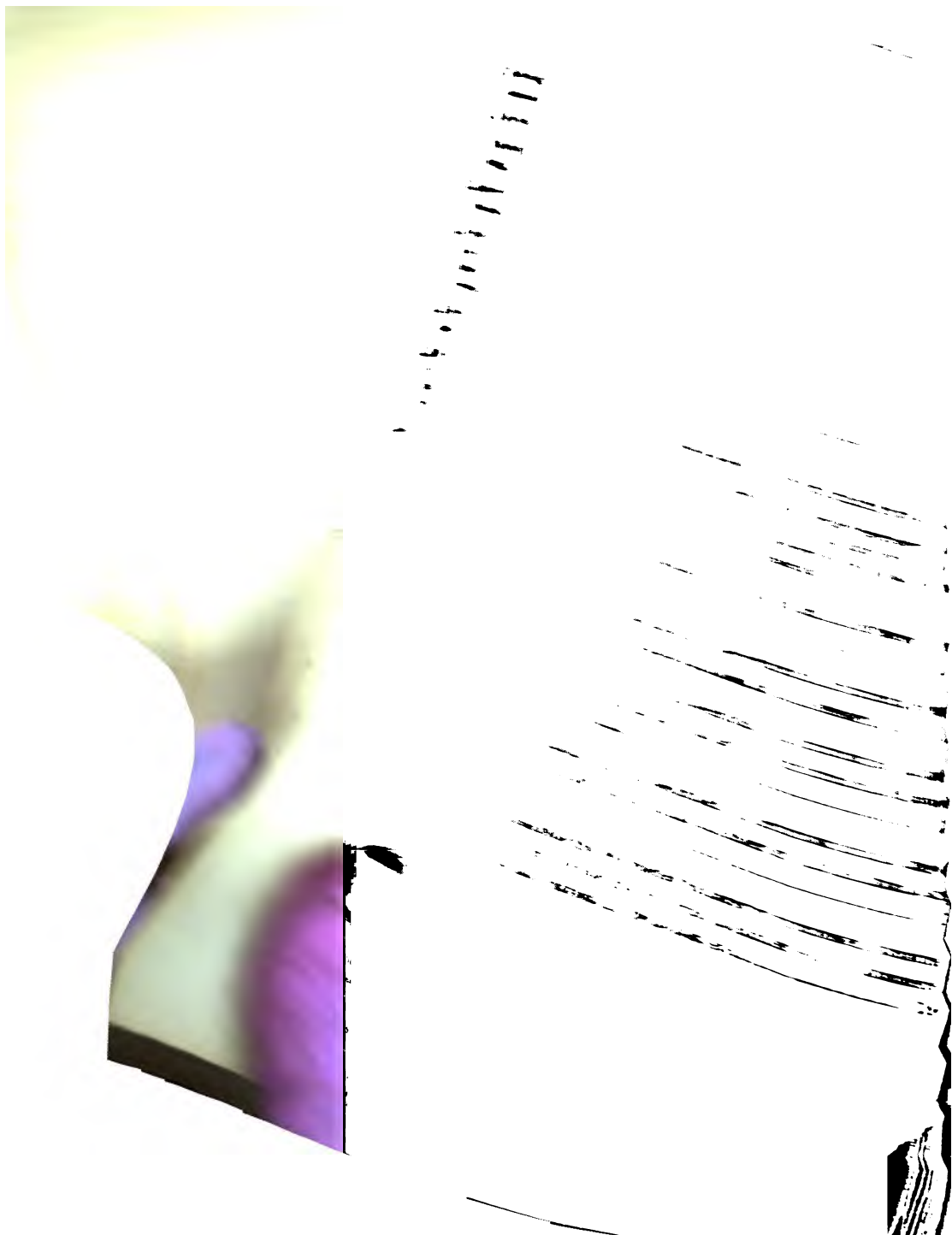
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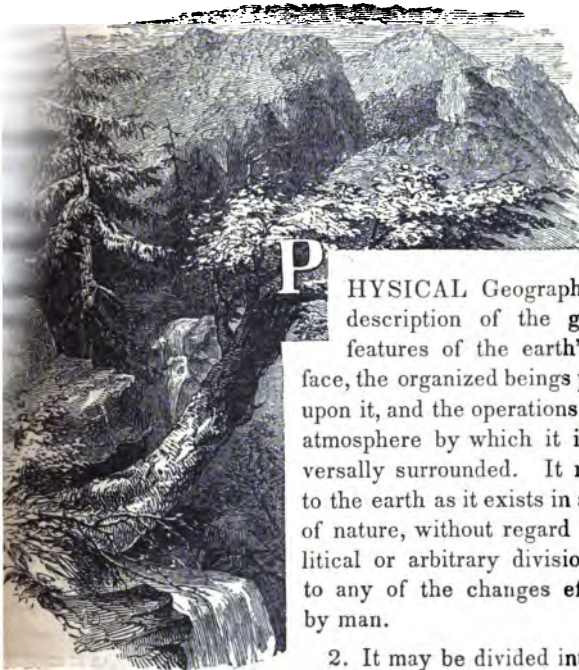
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INTRODUCTION.



PHYSICAL Geography is a description of the general features of the earth's surface, the organized beings placed upon it, and the operations of the atmosphere by which it is universally surrounded. It relates to the earth as it exists in a state of nature, without regard to political or arbitrary divisions, or to any of the changes effected by man.

2. It may be divided into four parts, relating respectively to the following subjects: 1. The **LAND**, of solid portion of the earth's surface; 2. The **WATER**

Questions.—1. What is Physical Geography? To what does it relate? 2. Into how many parts may it be divided? Name the subjects to which they relate.

•

the extent and distribution of the
continental masses and islands;
the great mountain systems; and
the vast plains, upland and lowland.
The various portions of the earth's sur-
face, volcanoes, earthquakes, etc., in
the aspect of the land portion of

the waters of the globe, whether
the origin and termination of rivers;
the nature of the seas, and the extent, depth,
and temperature of the oceanic waters.

... the operations of the atmosphere
... the laws in accordance
... the causes influencing their
... the phenomena of moisture, dew,
... the causes which are concerned

It describes the various regions which contribute to the animal kingdom, shows the origin and explains the progress of the world.

Physical elements are of a more permanent character than the civil or political affairs of mankind. The latter are frequently changed, either by conquests or treaties, by a changing people and new states and territories organized, suddenly into existence; and the arts of civilization, introduced into distant quarters of the earth. The varying population, internal improvements, and the like, furnish us with requisite constant correction of maps and make them constant exponents of political affairs.

What does the first part describe? To what does it also relate? 4. To what does the second part relate? To what does the third part treat? What does the fourth part relate? What does it describe? 7. What is natural geography? Illustrate. Varying condition of countries?

fluctuations do not belong to the science of Physical Geography. And majestic features which God has impressed on the face of—its continents and oceans—its mountains, valleys, rivers, and main now, with all their prominent characteristics, very nearly as they have existed for centuries past.

True that natural agencies are at work, changing to a limited extent of nature. Volcanic action has rent the crust of the earth in places, raising some portions and depressing others; some rivers have opened new channels, and formed extensive deltas at their mouths; Holland, vast areas of land have been rescued from the ocean by dikes and artificial modes of drainage. These and other alterations, however, as they may appear, are comparatively unimportant as regards the earth at large, and scarcely serve to qualify the remark, that the physical features of the earth has not greatly changed in modern times.

What is here observed, it must not be inferred that the earth is now in the scene of mighty convulsions. An examination of its surface—that at very early periods important changes successively took place to explain those changes, and the causes which have led to the present state or condition of the earth, belongs properly to the science of

Physical Geography explains many interesting facts of Civil Geography. It shows where nature has provided for the growth of cities, the states, the construction of railroads, canals, and other works of human improvement; it points out what courses on the ocean the mariner may take to avail himself of its favoring winds and currents; and explains why pursuits are best adapted to the people of different countries. The influence of mountains, rivers, seas, climate, and natural productions on the history of a people and the progress of nations is so great, that it is for one to acquire a thorough knowledge of general geography, and to understand the facts and principles of Physical Geography.

8. Do such fluctuations belong to the science of Physical Geography? 9. What are the main changes of the earth's surface produced? What is observed of these? 10. What does an examination of the earth's surface show? What belongs to the science of Geology? 11. Why is a knowledge of Physical Geography important?

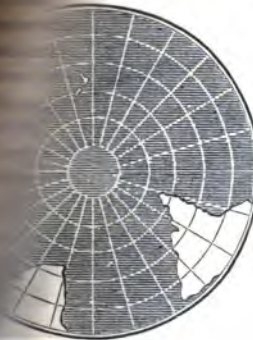


DISTRIBUTION OF THE LAND.

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on through the different zones is as follows :

HEMISPHERE.	Sq. Miles.	SOUTHERN HEMISPHERE.	Sq. Miles.
.....	2,792,000	Antarctic Zone	Unknown.
.....	24,488,000	Temperate Zone	3,305,000
.....	9,949,000	Torrid Zone	10,466,000
.....	37,229,000	Total	13,771,000



Southern Hemisphere.



Northern Hemisphere.

The unequal distribution of the land may be most striking when seen from an inspection of a map of the hemispheres, as shown upon the plain of the horizon of London. The hemisphere in which that city occupies the center, includes nearly all the land on the globe, while the other is almost covered with water.

One may therefore be termed the *continental* or *land hemisphere*; and the other, the *oceanic* or *water hemisphere*.



Water Hemisphere.



Land Hemisphere

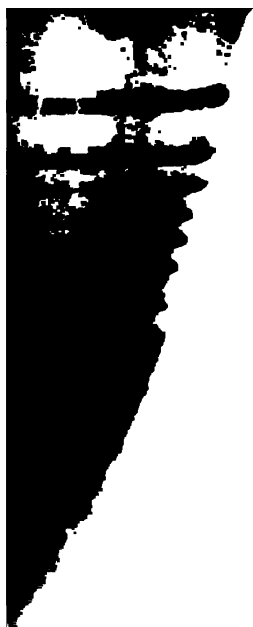
—13. How may the unequal distribution of the land be most strikingly shown? In which hemisphere includes nearly all the land? How termed?

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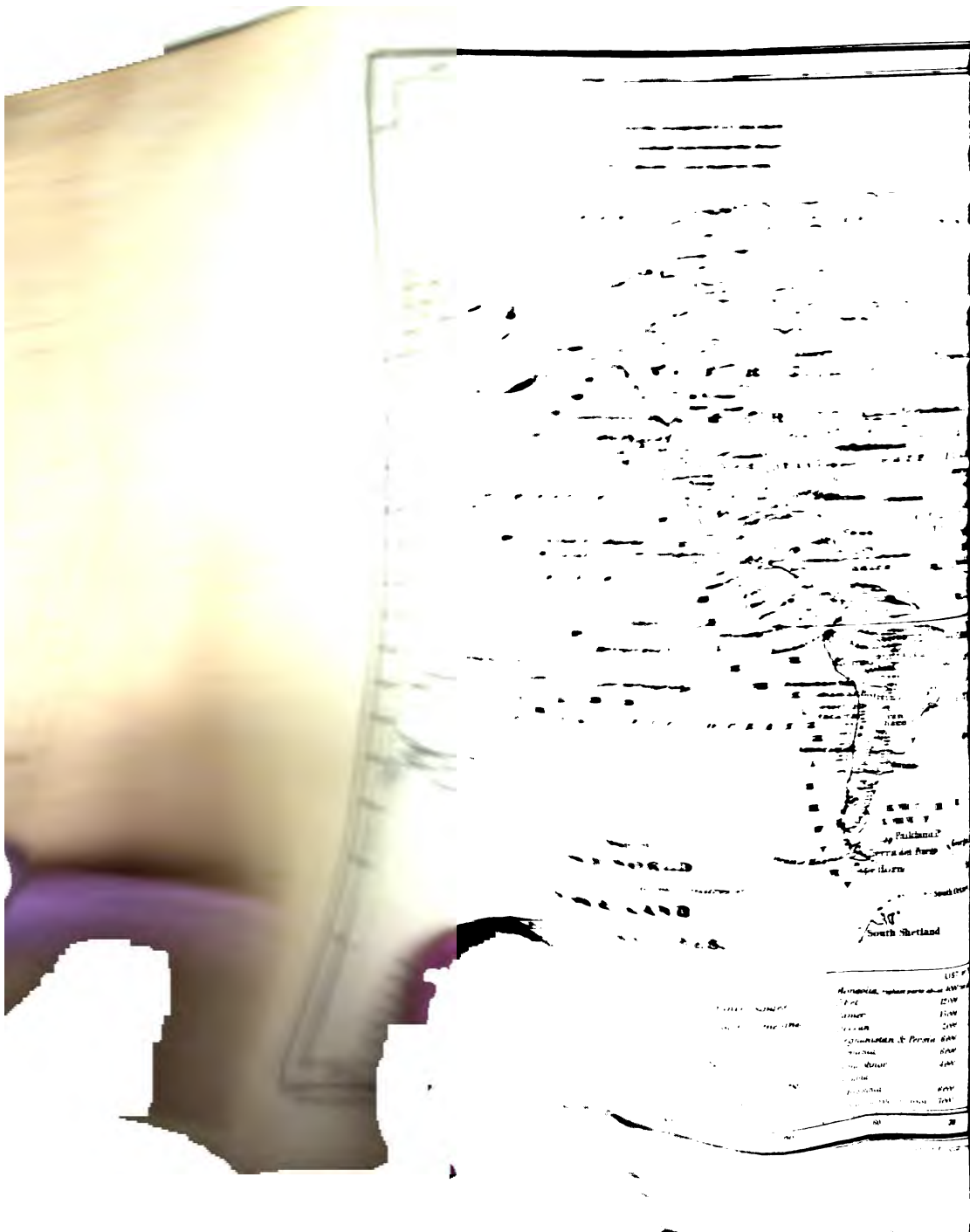
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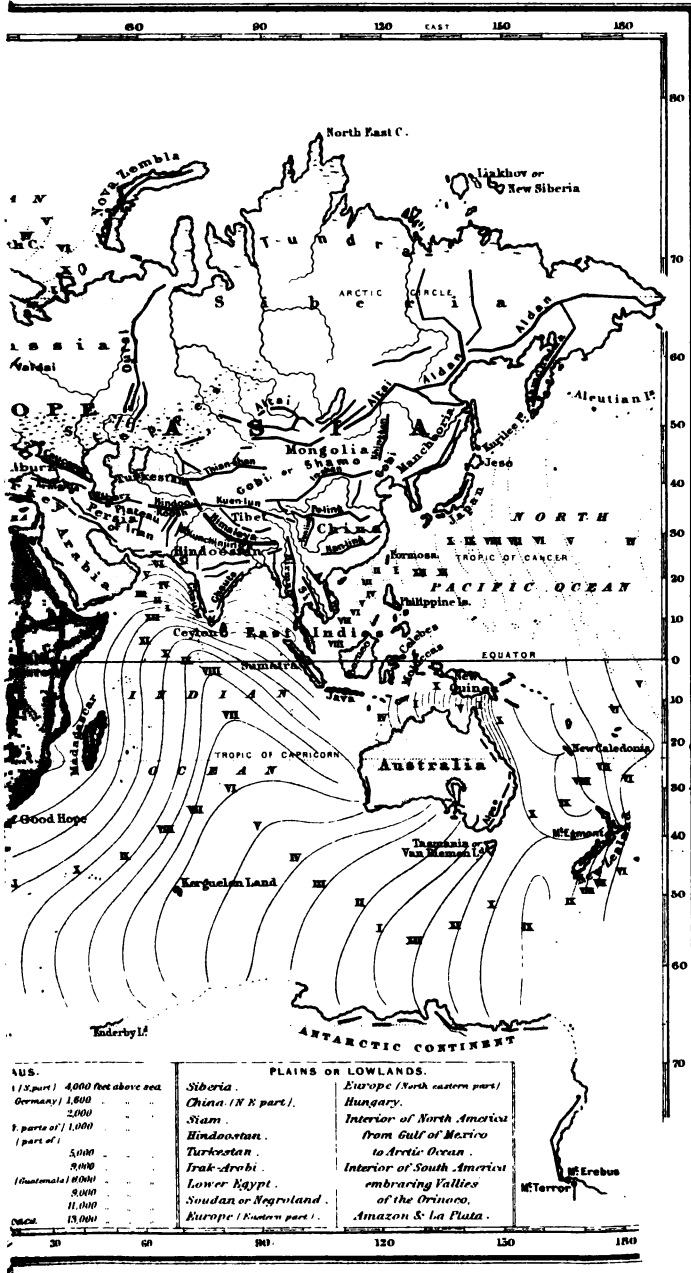
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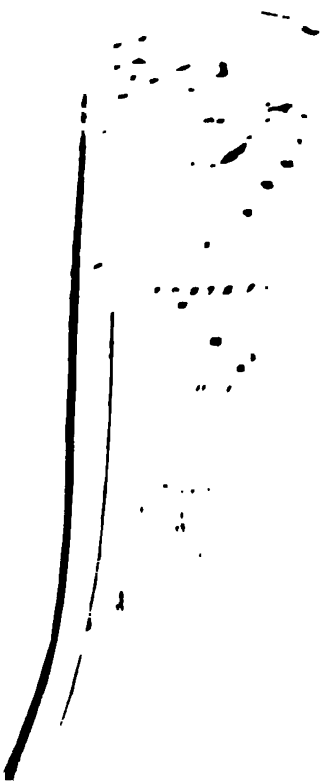
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Bay, Massachusetts Bay, Cape Cod, Long Island Sound, Chesapeake Bay, Albemarle Sound, and the Bay of Honduras, etc.

Of the two divisions of the world, the smaller of the two divisions of the world, the greatest length from north to south is the greatest width, from east to west, is about 6,420,000 square miles. Its broken coast-line of 14,500 miles in the sea-coast for every 420 square miles without bays or harbors.

Civilization in South America may be attributed to the want of bays and gulfs extending inland and access to its interior regions. The disadvantage of this, however, is partly counterbalanced by the vast navigation, the Amazon, La Plata, and their branches.

LESSON III.

CONTINENTS—(continued).

The American Continent is the largest mass of land on the globe, its greatest length from east to west, about 10,000 miles; and, from north to south, about 8,000 miles. Its area is nearly twice that of Europe, or two and one fourth times that of the African Continent.

South America is the smallest of the five grand divisions. Its greatest length from Cape St. Vincent, in the southwest, to the Cape of Good Hope, in the northeast, is about 3,500 miles; its greatest breadth, from North Cape to Cape Matapan, is about 2,400 miles. The area of its surface, including the islands, amounts to 17,000,000 square miles.

Europe is indented by numerous bays and seas on its northern and southern sides, in consequence of which the coast-

Questions.—21. What is said of South America? Greatest length? Breadth? Area? Extent of coast-line? 22. Slow progress of civilization in South America? Reason for its unbroken coast-line? 23. What is said of the Eastern Hemisphere? Its length and breadth? Area? 24. What is the comparative size of Europe and Asia? 25. What is said of its coast indentation? Extent of coast? 26. What is said of its peninsular character? What large peninsulas does it contain?

GENERAL REMARKS ON THE CONTINENTS.

When we examine the map of the world, we shall notice several features of similarity between the two continents. (1.) Each is divided into broad, extensive flats toward the north; while, toward the south, they narrow down to points, offering a rude resemblance to an inverted pyramid.

(2.) Both attain their greatest breadth near the parallel of 40°, and are cut off by the ocean at about latitude 70°.

(3.) Each has a large portion of its area nearly detached; North America being joined to North America by the Isthmus of Panama, about 30 miles broad; and Africa being connected with Asia by the Isthmus of Suez, about 75 miles broad.

(4.) The peninsulas of both continents follow a southerly position—as Scandinavia (embracing Sweden and Norway), Spain, Italy, Greece, Africa, Arabia, India, Malacca, Cambodia, Java, and Kamtschatka, in the one; and South America, California, Florida, and Alaska, in the other. There are two important exceptions to this rule; the peninsula of Yucatan, in Central America, and of Denmark, in Europe, both of which project toward the north.

33. The great point of dissimilarity between the Eastern Continent and the Western, is in the prevailing direction of the land which extends from east to west in the former, and from north to south in the latter.

34. Comparing the western shores of Europe and Africa with the eastern shores of North and South America, a mutual adaptation to unite may be observed in the advancing and retreating shape of the land. Thus, the great convexity of Western Africa is opposite the indentation of the Gulf of Mexico; and the convexity of the Brazilian shore is opposite the Gulf of Guinea. From this peculiar outline, the idea has been entertained that the two continents once formed an undivided territory which some great convulsion separated.

Questions.—29. What may be noticed by examining a map of the world? What is the first feature of similarity mentioned? 30. What is the second? 31. What is the third? 32. The fourth? What exceptions are there to the fourth remark? 33. What is the point of dissimilarity between the Eastern and Western continents? 34. What is observed by comparing the western shores of Europe and Asia with the eastern shores of North and South America?

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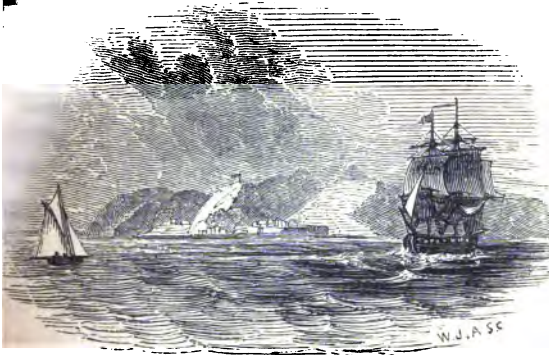
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4. The fourth part of the document provides a detailed overview of the accounting cycle, from the initial recording of transactions to the final preparation of financial statements. It includes a step-by-step guide to each stage of the cycle, ensuring that all necessary steps are followed to produce accurate and reliable financial information.

5. The fifth part of the document discusses the role of technology in modern accounting practices. It explores the benefits of using accounting software and digital tools to streamline processes, reduce errors, and improve the efficiency of financial reporting.

6. The sixth part of the document concludes by emphasizing the importance of ongoing education and professional development for accounting professionals. It highlights the need to stay up-to-date with the latest industry trends, regulations, and best practices to ensure the highest quality of financial reporting and management.

islands. On the northwestern beginning, on the south, with ge occurs at the southern ex- ling from Chiloe to Cape Horn. Aleutian Isles which form a chain ia, in the North Pacific; and the along the eastern Asiatic coast. called oceanic islands, are those which continents. They are very numerous in ns. They usually contain one or two ly situated with reference to others of ple, the Marquesas and Society groups. a sea interspersed with numerous islands. was originally applied to those islands e shores of Greece and Asia Minor. The s are the Caribbean, or Antilles, in the West e and Laccadive, in the Indian Ocean; the le, and Great Cyclades, in the Pacific Ocean. nds, at a great distance from any other shore, rence. St. Helena, remarkable for being the



St. Helena.

Napoleon's last exile, is 1,800 miles from the cor
1,200 from the coast of Africa, and 680 from Asc

40. What are clusters? Where numerous? How usually arranged?
What is an archipelago? How originally applied? Principal archip
said of single islands? St. Helena? Ascension Island?



...the sea like a
...followed
...ense steam and
...which gain-
...the height of 200
...feet, and a circumfer-
...the year, this island
...forming a dangerous shoal.

Where principally found? How
...in the Grecian Archipelago? 45
...of the island of Sabina. 45. Of

LESSON V.

CORAL ISLANDS.

A VAST number of islands and reefs* in the Pacific and Indian oceans are of coral formation. They owe their existence to the work of countless myriads of the coral-insect which inhabit the seas, and which flourish only in the warmer regions of the

Coralline structures are sometimes of immense extent. On the northeast coast of Australia is a reef of coral called the Great Barrier Reef, having a length of nearly 1,000 miles, and being, in part, unbroken for a distance of 350 miles. Some groups of coral islands in the Pacific are from 1,100 to 1,200 miles in length, by 300 or 400 in breadth; as, for examples, the Danger and Radack archipelagoes. The Maldive Islands, situated in the Indian Ocean, forming a chain of 470 geographical miles, are composed throughout of a series of circular assemblages of islets, formed of coral.

49. The following description of coral animals and their operations is from Hughes' "Manual of Geography:" "The coral reefs of the Pacific, as well as those in other parts of the globe, are all produced by the secretions of the coral-insect, and the process by which they are formed is one of the most curious and instructive phenomena which the natural world presents to view. The architects of these wonderful structures are *polypes* of minute size, and of various species, but all possessing a general similarity of form and structure. They consist, to appearance, of a little oblong bag of jelly, closed at one end, but having the other extremity open, and surrounded by tentacles (usually six or eight in number), set like the rays of a star.

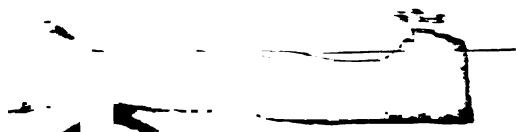
50. "Multitudes of these tiny creatures are associated in the secretion of a common stony skeleton, that is, the coral, or madrepore, in the minute orifices of which they reside; protruding their mouths and tentacles when under water, but the moment they are molested, or become exposed to the atmosphere, withdrawing by sudden contraction into their holes. It is proved by observation that these creatures are unable to exist at a greater

Questions.—47. Islands and reefs in the Indian and Pacific oceans? To what? 48. Extent of coralline structures? Great Barrier Reef? Groups in the Indian oceans? Examples? Maldive Islands? 49. Coral reefs, how formed? Are these wonderful structures? Of what do they consist? 50. Describe the operations of coral insects. To what depth do they exist? Upon what must coral islands be

* Reef, a chain or range of rocks lying at or near the surface of the water



... in the section



... a strip of coral, including

... the northern of the coral
... out of the thirty-two

... What does it surround?
... Lagoons found

visited by Beechey, in his voyage to the Pacific. The was thirty miles in diameter, and the smallest less than a There is almost always a deep narrow passage opening lagoon, generally on the leeward side, which is kept open flux of the sea, as the tide goes down; and, through this ships may sail into the inclosed waters, and find a good

Encircling-reefs are those which extend around mountain-ids, commonly at a distance of two or three miles from a, rising on the outside from a very deep ocean, and sep-om the land by a channel 200 or 300 feet deep. The Archipelago exhibits examples of this structure. Otaheite the largest of the Society group, is an instance of an en-land of the most beautiful kind, being hemmed in from a by a coral band, at a distance varying from half a mile miles.

Barrier-reefs are similar in their structure to the two pre-asses, but differ from them in their position with regard id. The largest of this class is the Great Barrier Reef northeast coast of Australia, before alluded to (48). It in the ocean at an average distance of from 20 to 30 n the shore, and extends to the distance of about 1,000

action of the waves as they dash upon this reef has been admired: "The long ocean-swell being suddenly impeded by this ted itself in one great continuous ridge of deep blue water, which, r, fell on the edge of the reef in an unbroken cataract of dazzling . Each line of breaker ran often one or two miles in length with ptible gap in its continuity. There was a simple grandeur, a power and beauty in this scene, that rose even to sublimity. The roar of the surf, with its regular pulsation of thunder, as each swell fell first on the outer edge of the reef, was almost deafening, -toned as not to interfere with the slightest nearer and sharper . . . But the sound and sight were such as to impress the spec-the consciousness of standing in the presence of an overwhelm-r. and power."

ie Florida reefs are of this class. By examining a

—54. Encircling-reefs? Example? Otaheite? 55. Barrier-reefs? class? 56. Describe the appearance of this reef. 57. To what class belong? Island south of Florida? The height? Where do they extend? Their size?

depth than twenty or
of the Pacific, and other
islands, though it was a
new described above.

51. Coral form
or lagoon island.

52. An *atoll*
rounding a shallow
reef, thus the
average breadth
rounded by a
cut represents
tranquil water.

The water
below.

mon of the worms at Loo-Choo (an island in the Pacific), the form of a star, with arms from four to six inches about with a rapid motion in all directions, probably others were so sluggish, that they were often mistaken; these were generally of a dark color, and from four and two or three round. When the rock was broken from level of high water, it was found to be a hard solid stone; it were detached at a level to which the tide reached discovered to be full of worms, all of different lengths and as fine as thread and several feet long, generally of a , and sometimes of a blue color; while others resembled were not unlike lobsters and prawns in shape, but soft, and es long.

with of coral ceases when the worm which creates it is no the washing of the tide. Thus a reef rises in the form of lower, till its top has gained the level of the highest tides, the worm has no power to carry its operations, and the reef, no longer extends itself upward. The surrounding parts, ance in succession till they reach the surface, where they also us, as the level of the highest tide is the eventual limit to the reef, a horizontal field comes to be formed coincident with and perpendicular on all sides. The reef, however, continually and being prevented from going higher, must extend itself lateral directions; and this growth being probably as rapid at the as it is lower down, the steepness of the face of the reef is prevented it is this circumstance which renders this species of rock so to navigation. In the first place, they are seldom seen above the d in the next, their sides are so abrupt that a ship's bows may inst the rock before any change of soundings indicates the ap- langer.

r a long time it was supposed that the coral formations were raised floor of the fathomless ocean by the unaided efforts of these ures, but more accurate observations have proved that the animals live at a greater depth than twenty or thirty fathoms. . . . f these islands are elevated 200 and 300 feet above the sea-level, t that they must have been raised by submarine forces; in short, lecano and the earthquake must have been employed in rearing heir present elevation. Mr. Darwin has traced those regions the Pacific, in which upheaval and depression alternately pre- a band of *atolls* and encircled islands, including the Danger- archipelagoes, constitutes an area of subsidence more than 4, and 600 broad. To the westward, the chain of *fringing-reefs* the islands of the New Hebrides, Solomon, and New Ireland is of elevated coral. Farther westward, another area of subsidence with, including the islands of New Caledonia, and the *Great Barrier*."

...the sea. They
...the presence of man. The
...or nature. They accumu-
...the rivers which water to
...the extent of the earth
...to its scenery. The
...their broken and free
...to excite in us emotions.

...of their heights? Can a man

are but few insulated mountains, or mountains rather masses, and ascending abruptly from a level. The examples are chiefly volcanic, as Mount Egmont, and the Peak of Teneriffe, on one of the Canary Islands. The usual arrangement is in groups or chains, the peaks of which are connected at the base. The term *system* is applied to a series of chains, groups, and parallel ranges lying in a general direction, though detached. The highest peaks are usually near the middle of the range.

The great mountain systems of the two continents follow the prevailing direction of the land in each; those of the western hemisphere running north and south; those of the eastern, east and west. The course of secondary chains, as the Apennines in Italy, the Dovrefield in Norway, and the Ghauts in India, corresponds to the greatest length of those peninsulas.

The highest known mountain on the globe is Mount Everest. It belongs to the Himalaya range, and is situated at 87° east. Its summit is 29,002 feet above the level of the sea. Situated in the same range, about 100 miles to the west of Mount Everest, is Kunchinjunga, next in height (28,156 feet), which was, till very recently, regarded as being the highest mountain on the globe. The loftiest mountain in South America is Tupungato,† one of the Chilean Andes (22,456 ft.); in North America, Mount St. Elias, one of the Rocky Mountains (18,000 ft.); in Africa, Mount Kilimandjaro (supposed 20,000 ft.); in Europe, Mont Blanc (15,760 ft.).

The mountains of the torrid zone are inhabitable by man only at considerable height. Under the equator, the line of perpetual snow now is not less than 16,000 feet above the level of the sea. As we approach the poles, this line gradually descends,

66. Insulated mountains? Examples? What is the usual arrangement of the peaks? 67. Direction of the great mountain systems of the two continents? 68. Course of the secondary chains? 69. The highest known mountain, its situation and height? Kunchinjunga? Name and height of the loftiest mountain in South America? In North America? In Africa? In Europe? 70. Habitable mountains in the torrid zone? The line of perpetual snow under the equator? Peaks?

The heights of Mount Everest and Kunchinjunga, as above stated, are according to the measurements of Col. Waugh, Surveyor-General of the British East Indies. The same authorities give the height of Dhawlagiri, formerly given at 28,078, to 26,826 ft.—[Error] whose altitude was formerly given at 28,944 feet, has been ascertained to be 1 foot high.—[Error.]

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	Feet.		Feet.
in the Grisons,		Quito, capital of Ecuador...	9,540
age in Europe .	6,714	Ladak, city, Little Tibet....	9,995
.....	7,570	Cuzco, ancient capital of Peru	11,880
y, Peru	7,852	Milum, village, Himalaya....	11,405
ie Great St. Ber-		La Paz, city, Bolivia	12,228
.....	8,170	Puno, city, Peru.....	12,870
3 Bogota, capital		Potosi, Bolivia, highest city	
ranada.....	8,650	of the globe	18,350
al of Bolivia....	9,250	Antisana, shepherds' huts,	
anta Maria, Alps,		Ecuador	18,454
permanent habita-		Tacora, village, Peru	18,690
Europe.....	9,272	Rumihausi, post-house, ditto	15,540

the summits of the loftiest mountains have never been

The difficulties encountered in ascending elevated mountains arise from the precipitous character of the surface, the accumulations of snow, the intense cold, and the rarity of the atmosphere. Travelers have found the rarefied atmosphere on high mountains to cause bleeding noses and eyes, and to produce other unpleasant effects.

The following list, are given some remarkable heights which have been attained:

	Names.	Dates.	Heights.
Alps	Dr. Paccard and James Balma	Aug., 1786.....	15,760
do.	The brothers Meyer, of Arau	1811.....	13,872
do.	Three peasants of the Tyrol	1804.....	12,818
Arvend	Mr. Taylor Thompson, 1st European.....	Sept. 9, 1837..	14,695
.....	Professor Parrot, and 5 attendants.....	Oct. 9, 1829..	17,828
Asia	Lieutenant John Wood	Feb. 19, 1883..	15,600
Auritus	Captain Lloyd and officers.....	Sept. 7, 1832..	2,900
Whyhee	Mr. David Douglas.....	Jan., 1834.....	13,587
at, New Zealand..	Dr. Dieffenbach.....	Dec., 1840.....	8,839
as	Humboldt and Bonpland	Jan., 1800.....	8,638
des	Bougner and Condamine	1786.....	15,924
do., point reach-	M. Boussegault and Colonel Hall, ..	1831.....	19,699
point of the			
attained by man			

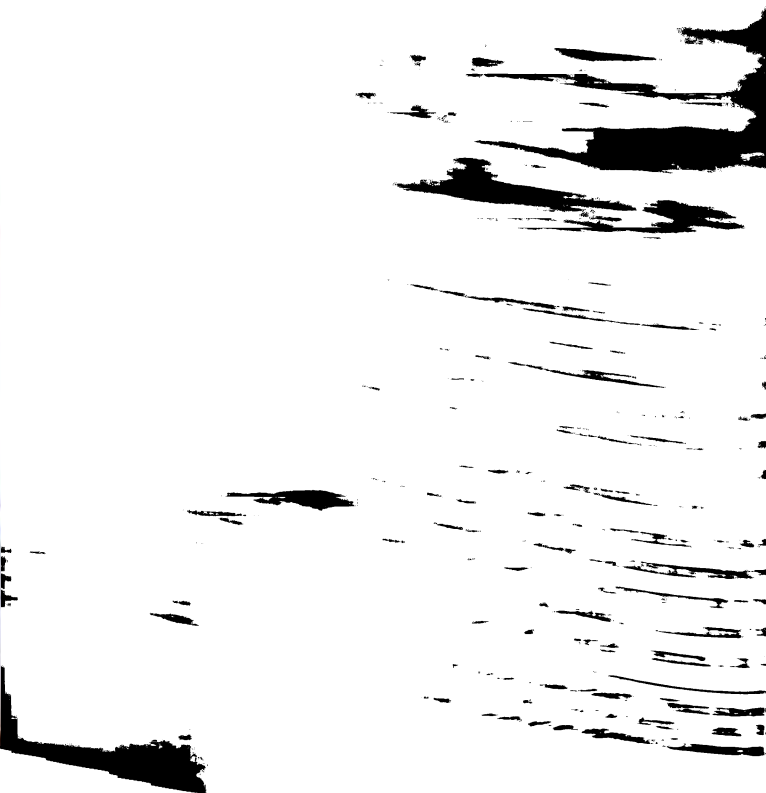
71. What is said of heights attained by adventurous travelers? The differing heights reached on the following mountains by whom: Mont Blanc, Jungfrau, Ortler Spitz, Peak of Demavend, Arazero Botte, Mauna Kea, Mount Egmont, Silla de Caracas, Pichincha, Chimborazo.

occur in the range of the Rocky Mountains of which is that known as the South Pass, It is at an altitude of more than 7,000 feet above the sea, and affords a passage so easy of travel that teams drawn by horses may travel through it. Thousands of emigrants, with their cattle, every year traverse the pass to the valleys of the Pacific.

The *Sierra Nevada* of the West Coast extend along the Peninsula of Alaska. They embrace the *Sierra Nevada* of California and the *Cascade Range* of Oregon. The elevated peaks are *Mount Hood*, in the Cascade Range (2,000 ft.); *Mount St. Elias*, near the 60th parallel; and *Mount Fairweather*, near the 59th parallel. The *Sierra Nevada* rises above the snow-line, and the elevation of between seven and eight thousand feet. The west of this range, lie the gold regions of Cali-

The *Apalachian*, or *Alleghany*, ranges constitute the third great mountain system of North America. They extend along the eastern side of the continent, and within the early settled portion of the United States. They terminate, at the south, near the Gulf of Mexico; and, at the north, near the shores of the Gulf of St. Lawrence. This range is broken by the valley of the St. Lawrence River and Lake Champlain. The southern portion, to which the term "Alleghany" is applied, consists of numerous parallel ridges separated by longitudinal valleys. The northern section embraces the *Green Mountains* of Vermont and the *White Mountains* of New Hampshire. The *Adirondack Mountains*, which extend through the northern part of New York, and the west of Lake Champlain, form a part of this system. Intermediate between the Adirondack Mountains and the main range of the Alleghanies, lie the *Catskill Mountains*, which are

Ex.—75. Where is the principal pass situated? What is said of it? 76. What mountains of the West Coast extend? What minor ranges do they embrace, their height and situation? What is said of the Sierra Nevada? Where do the mountains of California lie? 77. What is said of the Apalachian, or Alleghany? Where do they extend? Where do they terminate at the south? At the north, is this range broken? What is said of the southern portion? What mountainous section embraces? What is said of the Adirondack Mountains?



of from one to two thousand feet. They contain a number of lakes, and possess a climate of intense

Principal mountains in Mexico are isolated peaks, and are active volcanoes. Several of them lie along the 19th parallel of latitude; the more important being *Pico de Orizaba*, *Toluca*, *Popocatepetl*, and *Orizaba*.

AMERICAN MOUNTAINS.—South America likewise contains the great mountain systems; the chain of the Andes, the Guiana, and the mountains of Brazil.

The *Andes*, or *Cordilleras de los Andes* (*Chains of the Andes*), commence on the north near the Isthmus of Panama, and extend in a southerly direction to the Strait of Magellan. In Chile and in Patagonia, they form the coast-line; and, at a great distance, in about the middle of Chile, they are but 100 miles from the sea. Their general breadth rarely exceeds from 50 to 100 miles; but between the 20th and 25th parallels of latitude, upwards of 400 miles.

The Andes are divided, according to the countries through which they extend, into the Columbian, Peruvian, Bolivian, Chilean, and Patagonian Andes.

The *Columbian Andes* begin at the commencement of the mountainous regions on the north, and extend to the 4th degree of latitude. They have an average height of from 11,000 to 15,000 feet, and the highest peaks exceed 20,000 feet. The most elevated of them is *Chimborazo* (21,424 feet), which was supposed to be the loftiest mountain in the New World.

The *Peruvian* and *Bolivian Andes* extend from the 4th to the 28th parallel of south latitude, and are remarkable for the great number of their lofty summits, several having an altitude of

Questions.—80. What is said of the principal mountains in Mexico? What volcanoes lie along the line of the 19th parallel? 81. How many mountain systems does South America contain, and how are they designated? 82. Describe the situation of the Andes where do they form the coast-line, and where are they at the greatest distance from the coast? What is their general breadth? Their greatest breadth? 83. How are the Andes divided? 84. Where are the Columbian Andes situated? Average height? Highest peaks? 85. Between what parallels do the Peruvian and Bolivian Andes extend? For what are they remarkable? How high are many of the passes in this part of the Andes?

thian Mountains, the mountains of the Spanish peninsula, the Apennines of Italy. The north mountain regions extend through Norway and Sweden, constituting what are sometimes called the Scandinavian Mountains.

The *Balkan Mountains* are situated south of the River Danube, and extend from the shores of the Black Sea, in a westward direction, through the central part of Turkey in Europe. A branch leaves the main chain about the meridian of 23° east, and runs northward to the banks of the Danube; this may be called the North Balkan Mountains. South of the Balkan, are several considerable branches,—the Little Balkan, the Despotovo, and the chain of Mount Pindus, the latter stretching through the whole of the Grecian peninsula. The mountains of the Balkan system have but a moderate general elevation, not exceeding, on an average, from 2,000 to 3,000 feet above the sea-level. In some instances, however, they reach an altitude of 8,000 to 10,000 feet.

The *Alps* extend from about the meridian of 15° east to the Atlantic, in a semicircular sweep of about 1,000 miles, to the head of the Gulf of Genoa. Their breadth varies from 100 to 130 miles. They are highest in the western part, where the crest of the range has an average elevation of between 8,000 and 9,000 feet. Mont Blanc, their loftiest summit, and the highest mountain in Europe, has an elevation



View of the Alps.

Questions.—90. Where are the Balkan Mountains situated? What branch on the south? Height of the Balkan Mountains? 91. Describe the Alps. Their breadth? Average height in the western part? What is the height of Mont Blanc? Of numerous other summits? What is the height of the limit of perpetual snow? What is said of the pass of Mont Cenis? Great St. Bernard? Mont Cenis? Great road of the Simplon?

15,760 feet. Numerous summits exceed 10,000 feet in height, and rise above the limit of perpetual snow, the line of which is here between 8,000 and 9,000 feet above the level of the ocean. The most frequented pass, that of Mont Cenis (between Savoy and Piedmont), is 6,770 feet above the sea. It is much more steep and difficult on the Italian side than on that of Savoy. It consists of a plain, 6 miles long by 4 miles wide, encircled on all sides by the different eminences and ridges that form the summit of this part of the chain. The surrounding heights are from 2,500 to 4,500 feet above the plain. The pass of the Great St. Bernard



Dogs of St. Bernard.

is 8,170 feet high; it is celebrated for the passage of the French army over it in the year 1800, but more so for its hospice and sagacious dogs, employed in the rescue of travelers, benighted or endangered by the snow-storms. The pass of Mont Cervin, ~~is~~

and is the highest pass in Europe, triages. The great road of the Simon, attains an elevation of 6,585 feet.

imence near the head of the Gulf of southeasterly direction through Italy. the crest of the Apennines varies from in the central portion of the chain seven 7,000 and 8,000 feet high. A volcanic the west side of the Apennines between allels, and at its southern extremity is Mount in height, and the only active volcano in

ian Mountains are situated to the north of The higher portions have an elevation of 6,000 feet. A number of peaks, however, The Carpathians are, in general, exceedingly passes through them narrow and difficult. To 18th meridian are several ranges encompassing Bohemia, sometimes known as the *Hercynian* having an average elevation of from 2,000 to 3,000 range on the north of Bohemia is called the *Erz Ge-* signifying "ore mountains."

a mountains of the Spanish peninsula consist of the and the *Cantabrian Mountains* in the north; the *Cas-* untains, the *Mountains of Toledo*, the range of the *Si-* rena, which extend in nearly parallel courses through the part; and the range of the *Sierra Nevada* in the south. yrenees are about 300 miles in length, and have an aver- elevation of from 7,000 to 9,000 feet. Its highest summit, Mount Maladitta, is 11,168 feet in elevation. The Canta- Mountains have an average elevation of from 4,000 to 00 feet; but some of the summits exceed 10,000 feet. The untains of central Spain are not remarkable for great h.

Questions.—92. What is said of the Apennines? Height? Volcanic region? Vesuvius? 93. The Carpathian Mountains? Height? General character of the thian Mountains? Ranges to the west of the 18th meridian? 94. What are the mountain ranges of the Spanish peninsula? The Pyrenees? Mount Maladitta? Cantabrian Mountains? Mountains of central Spain? Highest summits? The

but few rising above 5,000 feet. The highest summits of the Spanish peninsula are those of the Sierra Nevada, the general height of which varies from 6,000 to 9,000 feet. The Peak of Mulhacen, in this range, has an elevation of 11,658 feet.

95. The mountains of Norway and Sweden, sometimes called the *Scandinavian Mountains*, extend along the Atlantic coast, from the Naze, the south point of Norway, to the North Cape. Their average height is from 3,000 to 5,000 feet; but some peaks, as the *Sneek-hætten* (*snow hat*), in the Dovre-field, are above 8,000 feet in height. The North Cape, in the island of Magerøe, which is a detached member of this mountain system, is a high mass of rock rising to 1,161 feet in elevation, and broken into pyramidal cliffs by the force of the waves.

96. The *Ural Mountains* form the eastern boundary of Europe. They extend from about the 51st parallel, a distance of more than 1,200 miles, to the vicinity of the Arctic Ocean. Their mean elevation is about 2,000 feet. The chain of *Mount Caucasus* extends between the Caspian and Black seas, through a length of more than 700 miles. The breadth of the whole mountain region exceeds 150 miles. The highest summit, called *El-burz* (*the mountain*), is 18,493 feet in elevation. The line of perpetual snow in the Caucasus is about 11,000 feet above the level of the sea.

97. ASIATIC MOUNTAINS.—Asia is remarkable for embracing the most extensive mountain system in the world. The ranges extend mostly in an east and west direction, from the eastern extremity of the continent to the shore of the Mediterranean. Among the principal chains, are the Aldan, or Stanovoi Mountains, the Altai, the Thian-shan, the Kuen-lun, the Himalaya, the Hindoo-Koosh, the mountains of Armenia, and the chain of Mount Taurus.

98. The *Himalaya Mountains*, which border the plateau of Tibet on the south, contain the loftiest summits on the globe.

Questions.—95. The mountains of Norway and Sweden? Average height? The North Cape? 96. The Ural Mountains? Extent? Mean elevation? Mount Caucasus? El-burz? Line of perpetual snow? 97. For what is Asia remarkable? General direction of the ranges? Principal chains? 98. Himalaya Mountains? Their length and breadth? Mean elevation? Snow-line? Passes?

feet, and is the highest of the range from 200
carriages. The height is 5,000 to
feet. The range is covered
is about
northern side
the Himalaya
above the level

an east and west
rangs, border the great
north. The *Thian-*
mediate to the Altai and
Great Desert of Shamo,
and *Khin-ghan*. *Pe-ling*
(mountains) extend in an
separated by the basin of

Hindoo-Koosh, the summits of
feet above the level of the sea,
rangs unite: this region joins
entral Asia with those in the western
Paropamisan extend west from the
northern borders of the plateau of Iran.
are a continuation of the same range, and
aspian Sea, rising in *Mount Demavend* to
et. The *Soleimaun* (or *Suleimaun*) *Mount-*
et, and the *Zagros Mountains* on the west of

Mountains of Armenia, situated between the Caspian
and waters of the River Tigris, are very irregularly
Mount Ararat, the highest of these mountains, at-
vation of 17,323 feet above the level of the sea, and
with perpetual snow. The chain of *Mount Taurus*

9. The Altai Mountains? Thian-shan and Kuen-lun ranges?
east of the Great Desert of Shamo? The Pe-ling and Nan-ling?
osh? What regions do they unite? The Paropamisan? The E-
e Solemaun Mountains? The Zagros? 101. The mountains of A-
arat? Mount Taurus? Argaeus? The mountains of Lebanon? M-
nai Mountains?

rus extends through Asia Minor, and has an average elevation of from 4,000 to 5,000 feet; its highest summit, *Mount Argæus*, is



Mount Ararat.

12,869 feet above the sea. The *Mountains of Lebanon* extend along the coast of Syria in a north and south direction. *Mount Hermon*, their loftiest summit, is 11,030 feet above the sea-level, and borders on the region of perpetual snow. The highest peak of the *Sinai Mountains*, which stand at the head of the Red Sea, is 9,300 feet above the sea.

102. Mountain ranges also extend through Arabia, Hindoostan, the Indo-Chinese peninsula, and the peninsulas of Corea and Kamtchatka.

103. AFRICAN MOUNTAINS.—A range of mountains extends along the northern shores of Africa called *Mount Atlas*. It has a mean elevation of from 3,000 to 5,000 feet; but *Mount Mitsin*, to the southeastward of the city of Morocco, is found to be 11,400 feet in altitude. To the eastward of the 4th meridian of west longitude is a series of ranges nowhere more than from 3,000 to 4,000 feet high.

104. The *Mountains of Abyssinia* constitute another mountain

Questions.—102. Other mountain ranges? 103. What mountains in the north of Africa? Mean elevation? Mount Mitsin? 104. On what do the mountains of Abyssinia rest? Height of the highest summits? The valley of the Nile? Mountains near the Red Sea?

ca. They rest on an extensive plateau whose elevation is from 6,000 to 8,000 feet. The highest summits are up to 10,000 feet above the sea, and are covered with perpetual snow. The valley of the Nile, through nearly its entire course, is crossed by high rocks or hills of an elevation rarely exceeding 10,000 feet. Near the Red Sea, there is a succession of mountain groups, some of which reach from 6,000 to 10,000 feet in height.

The third mountain system of Africa extends along the eastern coast, between the parallels of 14° north, and 18° south latitude. Those which run in an easterly and westerly direction, north of the Gulf of Guinea, are known by the name of *Kong Mountains*; their general height is from 3,000 to 4,000 feet. The *Peak of Cameroons*, near the coast of the Bight of Biafra, is a detached mountain mass, 13,760 feet in height. In the island of Fernando Po, *Clarence Peak* rises to 10,655 feet. The extreme unhealthfulness of the climate, combined with the prevalence of malarial fevers, has prevented any thing like a full survey of even the eastern regions of Africa; and a very large portion of the vast interior remains almost entirely unknown. It is probable that many more elevations may yet be discovered in the central part.

6. A fourth series of mountain chains, known as the *Mountains of the Moon*, extends along the eastern coast of Africa, though not generally at a considerable distance inland. But little is known respecting this range. It is supposed to form the border of a great interior table-land. *Mount Kilimandjaro*, in latitude 4° south, was discovered by a missionary in 1849. Its summit is covered with perpetual snow, whence its elevation is assumed to be not less than 20,000 feet. *Mount Kenia*, a volcano, situated a little south of the equator, is supposed to have about the same elevation.

107. In South Africa, there is a mountain chain having a general east and west direction, called the *Nieuvelde Mountains*. The altitude of the highest portions exceeds 10,000 feet. The *Table Mountain*, in the neighborhood of the Cape of Good Hope, has a flat-topped summit, 3,582 feet above the level of the sea.

Questions.—105. What is the third mountain system? The Kong Mountains? The Cameroons? Clarence Peak? 106. A fourth series of mountain chains? What is known respecting it? Mount Kilimandjaro? Mount Kenia? 107. What mountain is in South Africa? Greatest elevation? The Table Mountain?

LESSON IX.

UPLAND PLAINS, OR TABLE-LANDS.

108. UPLAND plains, sometimes called table-lands, or plateaus, are extensive tracts whose general level is considerably elevated above that of the sea. They are commonly skirted by mountain ranges which, in some cases, descend abruptly into the surrounding plains. Some of these elevated plains support upon their surface large mountain ranges, which, although of inconsiderable height above the plateau, are yet of great elevation above the level of the sea. Table-lands vary in height from 2,000 to 15,000 feet.

109. The most extensive table-lands of North America are those situated in Mexico. They embrace the plateau of Anahuac, and extend from about the 42d parallel southward to the peninsula of Tehuantepec. This vast highland consists of a series of plains of different elevations. The highest part of the plain of Toluca, upon which the city of Mexico stands, is 9,000 feet above the level of the sea. Farther to the southeast, are the plateaus of Guatemala and Honduras, which exceed 6,000 feet.

110. The plateau of Chihuahua, lying to the north of the 24th parallel, varies from 4,000 to 6,000 feet in height, the southern portion being the more elevated. It has a generally level surface, and a great part of it is desert. It contains many dry salt-lakes, and most of the rivers which cross it, terminate on the table-land without finding any outlet to the coast. The plain of Anahuac is more generally fertile, though arid in many parts.

111. Along the base of the Rocky Mountains a succession of barren plains extends eastward, for a distance of 400 miles, toward the valley of the Mississippi. Through these regions the Red, Arkansas, and other rivers flow in channels considerably

Questions.—108. What are upland plains, table-lands, or plateaus? How commonly skirted? Mountain ranges supported by them? Height of table-lands? 109. Table-lands of North America? What large plateaus do they embrace, and where do they extend? Of what does this vast highland consist? Elevation of the plain of Toluca? Of the plateaus of Guatemala and Honduras? 110. Describe the plateau of Chihuahua. What is said of its lakes and rivers? The plain of Anahuac? 111. Plains east of the Rocky Mountains? Between the Rocky Mountains and the Pacific?

They rest on an extensive plain in the Rocky Mountains, at an elevation of 8,000 feet. The plain is a part, of high level, above the sea, and is the Great Basin or the Niles, through which the Colorado flows. The rocks or hills of the basin are characterized by their high elevations (79) and are not very different from any thing like a full mountain as they are at present, but are not so high as the mountains of the West.

Those which are for containing some of the highest peaks of the world, that which surrounds Lake Titicaca, is at a level of the sea, and is surrounded by the Cordillera of the Andes. The plain of Antisana, in Ecuador, is one of a mountain by the same name, and is covered with snow, and seems like an islet in the sea. It is 15,151 feet high, and contains the highest peak of the Cordillera, at the foot of the cone, being one of the highest peaks of the world by man.

The most extensive table-land of Europe is that of Spain. It is a large plain of an elevated tract which reaches an elevation of 3,000 feet, and on its south to the south, Madrid, the capital, has an elevation of 2,170 feet. Bavaria, in central Europe, reaches a height of 2,000 feet. The southwest portion of the Scandinavian Peninsula is a plateau of moderate elevation. There are many plateaus, such as the plateau of the Valdai, the Valdai, etc.

The most widely extended system of table-lands is that of Asia. Between the Himalaya Mountains on the north, and the Tianshan Mountains on the north, extends the vast plateau of Tibet, at an elevation of from 3,000 to 12,000 feet. In the south, the plain of Tibet attains the

ends in the northern part of North America? 113. For what is said of the plain which surrounds Lake Titicaca? 114. The most extensive table-land in the north and south? Elevation of Madrid? The plateau? 115. Plateaus of Asia? Describe the situation of the plateau of Tibet? The great desert of Shanxi? Plateau of the Deccan?

remarkable height of 12,000 feet. Farther north is the great desert of Shamo, or Gobi, which has an elevation of from 4,000 to 5,000 feet. Nearly the whole of southwestern Asia is elevated into table-lands, among which are the plateau of Iran, the plateau of Asia Minor, and the plateau of Arabia. These plateaus have an elevation of from 2,000 to 4,000 feet. The plateau of the Deccan forms the southern portion of Hindoostan, and has an elevation of about 2,000 feet.

116. The Sahara (or Great Desert) of Africa, forms a plateau of moderate elevation, probably not more in general than from 1,000 to 1,500 feet above the sea, though particular portions of it reach the height of 2,000 feet. It is supposed a vast table-land stretches from the 5th or 6th parallel of north latitude to the neighborhood of Cape Colony.

LESSON X.

LOWLAND PLAINS.

117. LOWLAND plains are distinguished from plateaus by being only slightly elevated above the sea-level. In some cases they are considerably below it; as, for examples, the regions around the Caspian Sea and the Sea of Aral. They embrace the most fertile regions of the globe, and being commonly traversed by navigable rivers affording facilities for inland commerce and communication, they constitute the principal abodes of man, and the seats of industry and wealth.

118. NORTH AMERICAN PLAINS.—The central portion of North America, extending from the Gulf of Mexico to the Arctic Ocean, forms one immense plain, estimated to possess over two and a quarter millions of square miles, or nearly one third of the area of the entire continent. A rising ground divides it into a

Questions.—116. Sahara? Table-land of South Africa? 117. How are lowland plains distinguished from plateaus? In what cases are they below the sea-level? What do they embrace? 118. What are the situation and extent of the great central plain of North America? How divided?

ALINE, OR WATER-LAIN

face. The [redacted] is drained by the [redacted] Arctic Ocean, and [redacted] Mexico.

[redacted] the Apalachian sys-
[redacted] form the eastern
[redacted] limit, south of the
101st meridian; above
[redacted] to the mouth of the
[redacted] st.

ations throughout this im-
[redacted] the south, and a plateau of
west of Lake Superior. The
[redacted] the base of the Alleghany
[redacted] son's Bay, are generally well
[redacted] small elevation. The middle
[redacted] the Mississippi and Missouri, and
[redacted] the upper portions of the Macken-
[redacted] ons, called *prairies*.

ee kinds :

These usually contain springs, and are covered
[redacted] nes, and varieties of flowers.



Prairie Scene.

dary on the east and west? Its western limit? 120
The middle parts? 121. Into how many kinds may
Bushy Prairies,—the Dry, or Rolling Prairies,—the N

(2.) The *Dry or Rolling Prairies* are so called on account of their freedom from swamps or pools, and from their wavy surface. The vegetation consists, principally, of grass, weeds, and flowers, which grow with great luxuriance. Over these prairies, the American buffalo roams, in herds of from 40,000 to 50,000.

(3.) The *Moist or Wet Prairies*, the least numerous, abound in stagnant pools, formed by the floods of the rainy seasons. They are covered with a rich vegetation of tall rank grass.

122. Along the Atlantic coast, between the base of the Appalachian Mountains and the sea, stretches a plain, or a comparatively level region, narrow in its northern portion, but increasing to a width of about 250 miles toward its southern limits, as the mountains recede from the coast. Extensive swamps line the coast in several places, and the soil, near the sea-shore, is frequently sterile; but, farther inland, the country improves and contains many fertile tracts. The peninsula of Florida, which belongs to this region, is low and flat, and a large portion of it is covered with swamps.

123. SOUTH AMERICAN PLAINS.—A great central plain extends through the entire length of South America. It is divided into three principal portions—the plain of the Orinoco, the plain of the Amazon, and the plain of the Rio de la Plata,—deriving their names from the three principal rivers by which they are respectively drained. These divisions are distinguished by the names of llanos, selvas, and pampas.

124. The *Llanos*, or *Level Fields*, are those vast plains in Venezuela and New Granada which extend to the north and west from the Orinoco. They have a very level surface, and so gently do they slope toward the sea, that a slight rise in the Orinoco reverses the current of the tributary streams. At the close of the rainy season, the llanos are covered with luxuriant grass, and form rich pasture grounds; but, during the dry months which succeed, the vegetation is entirely destroyed, and the parched ground opens in deep and wide crevices, giving the whole country the aspect of desolation and sterility.

Questions.—122. Describe the plain of the Atlantic coast. The peninsula of Florida. 123. Into how many portions is the great central plain of South America divided? By what names are they distinguished? 124. Where are the llanos situated? What is said of their level surface? How covered during the rainy season? Their aspect during the dry season?

—the former being drained to the
Hudson's Bay and the Arctic Ocean
by the Gulf of Mexico.

bounded on the east by the Appalachian
by the highlands which form the
divide. Its western boundary is the
Rocky Mts. The Mississippi River
is a noble river, and its
valley is fertile.

The Mississippi River is the
great artery of the continent.
It is the great highway of the
west, and its waters are the
life of the nation.

VICA.

extend over the lower por-
tion and within the limits to which
the river and its tributaries extend.
covered with dense forests.

describes the selvas of South

by the spoils of the forest, consists of the
flooding in the deep and dark recesses of these
a breath of air penetrates, and where, after be-
dical rains, the damp is so excessive that a blue
growing among the huge stems of the trees, and en-
stretching from bough to bough. A death-
rise to sunset; then the thousands of animals
in one loud discordant roar, not continuous,
seem to be periodically and unanimously roused
all the forest rings in universal uproar. Pro-
night, which is broken at the dawn of morning
the wild chorus. Nightingales, too, have their
pause they

set forth in choral minstrelsy,
sudden gale had swept at once
every harp."—COLERIDGE."

selvas? How covered? Mrs. Somerville's description

127. The *Pampas*, or *Flats*, are immense level plains, variously covered with long, coarse grass, mixed with wild oats, clover, and other herbage. The country between the 32d and 39th parallels consists of swampy tracts, overgrown with canes and tall reeds, and in other districts covered with gigantic thistles, which grow to the height of eight feet, and so thick as literally to render the country impassable. During nine months of the year the thistles are here the predominant (and almost the only) feature of the vegetable kingdom, but with the heats of the summer they become burned up, and their tall leafless stems are leveled to the ground by the powerful blast of the *pampero*, or southwest wind, from the snowy ranges of the Andes, after which the earth is covered for a brief time with herbage. This is destined, with the return of spring, again to give way to the stronger vegetation, which it had succeeded, and for a time supplanted.

128. The plain which extends from the banks of the Negro (latitude 39° south) to the southern extremity of the continent, is, for the most part, barren; in some places, it is covered with sand mixed with stones and gravel. It contains no trees; but a scanty vegetation of shrubs and herbage is found in a few hollows and ravines.*

LESSON XI.

GLACIERS.

129. A GLACIER† is a field or immense mass of ice formed in deep, but elevated valleys, or on the sides of mountains. Glaciers occur very extensively among the Alps, the Pyrenees, and the mountains of Norway. They are also found on the coast of Greenland, and among the Andes of Patagonia. They occur,

Questions.—127. What are the Pampas? Describe the country between the 32d and 39th parallels. 128. Describe the plain which extends to the south of the Negro. 129. What is a glacier? Where do glaciers occur extensively? Number of the glaciers along the central part of the Alps? Their extent? Number of square miles covered by the glaciers of Switzerland?

* Hughes' Manual of Geography.

† GLACIER is from the Latin *glacies*, ice. The French word *glaciers*, from *glace*, signifies an ice-house.

greatest extent in
part of the Alps,



View of a Glacier

European rivers.

composed of solid ice; but consist of a
water. They owe their origin to the
snow which falls from the sides of the
only partially melted during the short
regions.

able fact concerning glaciers, that they have
rivers. This movement is very slow; amount-
to not more than one foot in twenty-four hours.
that of rivers, is most rapid in the middle and
becoming, on account of friction, gradually slower
from and sides. M. Agassiz, in 1841 and 1842,
following results upon this point:

	Annual Motion.
Stake nearest the center of the glacier...	269 feet.
Stake nearest the side of the glacier	160 "
Stake nearest the center	245 "
Stake nearest the side.....	125 "

rate of motion depends upon the seasons; thawing

What do glaciers consist? Their origin? 131. Remarkable
State of movement? In what part most rapid? Results obtained
on what does the rate of motion depend? State the movement
different seasons.

weather, and a wet state of the ice, conducing to its advancement; while cold, whether sudden or prolonged, checks its progress. The ice near the shore of the *Mer de Glace* (Sea of Ice), near Chamouni, was found to move as follows :

From June 29 to Sept. 28	132 feet.
“ Sept. 28 to Dec. 12	70 “
“ Dec. 12 to Feb. 17	76 “
“ Feb. 17 to April 4	66 “
“ April 4 to June 8	88 “

133. Glaciers, originating in the regions of eternal frost, descend far below the line of perpetual snow. The lowest limit to which perpetual snow extends downward in the Swiss Alps is about 8,500 feet above the level of the sea. The lower glacier of the Aar descends more than 1,500 feet below the snow-line; while others descend 4,000 or 5,000 below the region of perpetual snow and ice; as, for examples, the glaciers of the Upper and Lower Grindelwald.

134. The appearance of glaciers is thus described by Lyell :

“ When they descend steep slopes and precipices, or are forced through narrow gorges, the ice is broken up, and assumes the most fantastic and picturesque forms, with lofty peaks and pinnacles, projecting above the general level. These snow-white masses are often relieved by a dark background of pines, as in the valley of Chamouni; and are not only surrounded with abundance of the wild rhododendron in full flower, but encroach still lower into the region of cultivation, and trespass on fields where the tobacco-plant is flourishing by the side of the peasant's hut.”

135. Snow mountains and glaciers, though devoid of vegetation in the upper regions, and presenting a picture of desolation on a scale of magnificence which makes it awful, are yet a striking instance of the truth that nothing was made in vain.

“ Herds of chamois are at home amid the frozen heights of the Alps; the Thibetian cow can only bear the climate of the valleys in winter; nor can man pronounce such districts barren, though cheerless in appearance, and never intended for his residence. They minister to his comfort, happiness, and even luxury, as the inexhaustible sources of those streams, which in summer, when other waters are evaporated and dried up, roll on through the plains, fountains of fertility and plenty. The Rhine, Rhoné, Po, Reuss,

Questions.—133. Do glaciers descend below the limit of perpetual snow? What is the lowest limit of perpetual snow on the Alps? To what distance below this line are glaciers known to descend? 134. Appearance of glaciers as described by Lyell? 135. What remark is made of snow mountains and glaciers? How illustrated?

to the greatest extent in
the central part of the Alps,



View of a Glacier

European rivers.

composed of solid ice; but consist of a
water. They owe their origin to the
which falls from the sides of the
only partially melted during the short
seasons.

fact concerning glaciers, that they have

This movement is very slow; and
more than one foot in twenty-four hours.
Rivers, is most rapid in the middle of

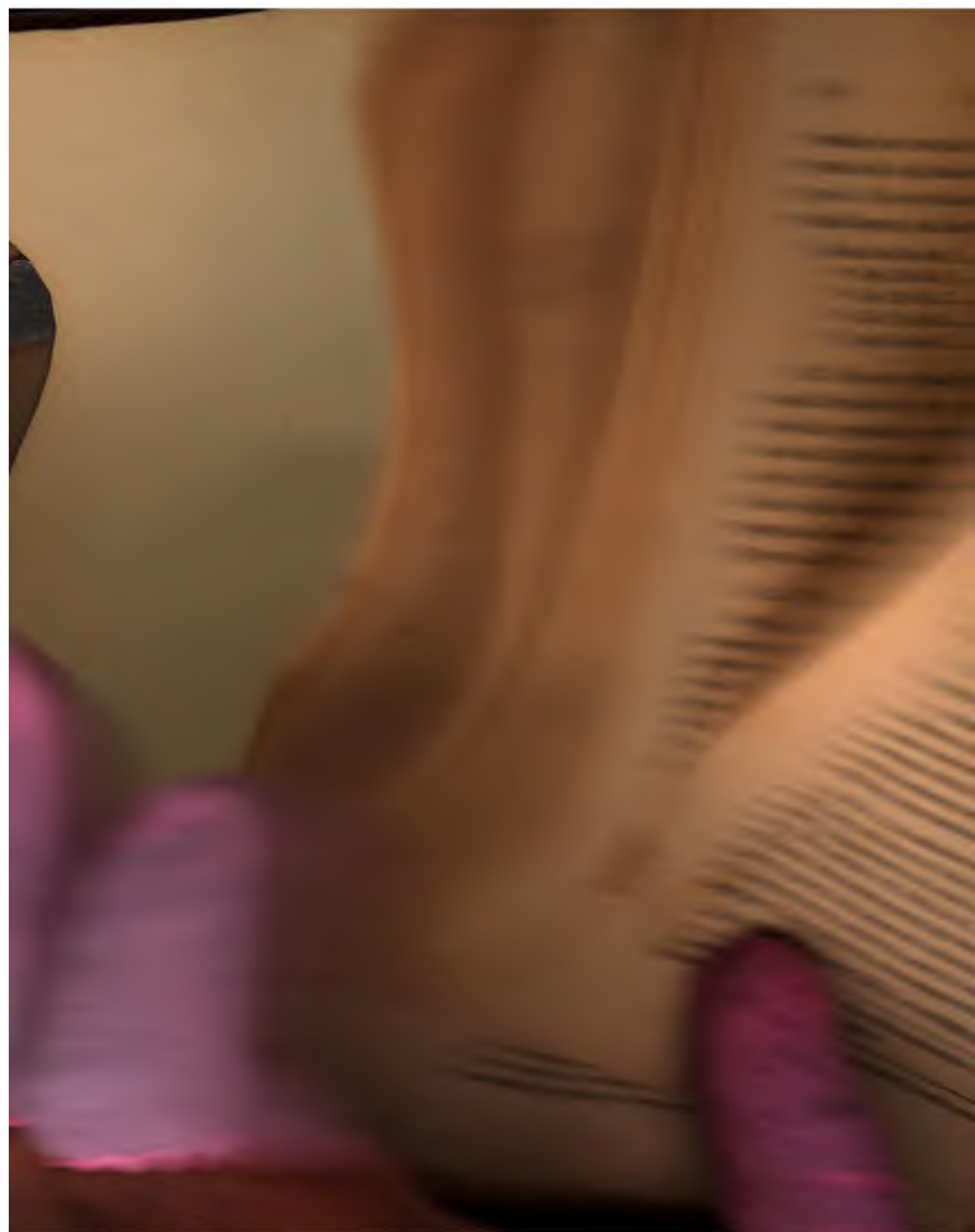
late enor-
into the sur-

These descend-

ment of other masses,
violence, uprooting trees,
and stopping the flow of

common in Switzerland, where they

now covered? Where only do everlasting frosts prevail?
Elevation at which perpetual snow begins at the equator?
line at the 80°? 137. Principal localities of permanent
snows? 138. Accumulation of snow masses? What
at 139. Where are such falls very common? What are
the way? What four kinds are noticed?



and rivers, respectively flowing to the Black and Caspian seas, are fed from the same source. This catastrophe occurred by the inhabitation of the prolonged, obtaining a new to sustain life.

LESSON XIII.

For four days. While was alarmed by a mysterious being in distress; but no with his dog. The sound frequently preceded a grand disturbed and quivering. Suddenly into the hospice. He went to pray, when the avalanche came but the one which was then his dog succeeded in working his way in safety, firmly regarding his; and to every pious mind it will dwell in the secret place of the flow of the Almighty."

LESSON XIII.

VOLCANOES.

A volcano (derived from Vulcanus, the name which the Romans gave to their imaginary god of fire) is applied to mountains which send forth, from their summits, smoke, ashes, and streams of melted matter. The term is also applied to mountains having eruptions of mud which are hence called Mud Volcanoes.

Volcanoes are generally of a conical shape, with a hollow at their summit, called the crater, or cup, the sides of which sometimes entire, like the walls of a circus, but more con-

146. From what is the term volcano derived? To what is it applied? What is the opening at the summit called? Its appearance at the bottom or floor of craters?



are often very destructive, as will be seen from the accounts of volcanoes, given in a succeeding lesson.

2. There are supposed to be about 300 volcanoes on the earth, about two thirds of which are situated in islands, the remainder being confined to the continents. Their distribution is given in the following table :

	On Continents.	On Islands.	Total.
Europe	1	20	24
Asia	17	29	46
Africa	2	9	11
America	86	28	114
Oceanica	—	108	108
	109	194	303

LESSON XIV.

VOLCANIC REGIONS.*

151. VOLCANIC REGIONS OF THE ANDES.—The Andes of South America embrace three extensive volcanic regions. The first is known as the Chilean range, the second as the Peruvian, and the third as the volcanic region of Quito. These regions are separated by extensive tracts, in which no volcanic action has been known to occur since the discovery of America.

152. The volcanic range of Chile embraces the most southern line of active vents. It extends from latitude $43^{\circ} 28'$ south, or from a point on a range with the island of Chiloe to Coquimbo, in latitude 30° south—a distance of nearly fourteen degrees of latitude. This region is remarkable for containing the highest known volcano in the world, that of Aconcagua (22,301 feet). To the north is a space of more than eight degrees of latitude, in which no recent volcanic eruptions have been observed.

Questions.—150. Number of volcanoes? How many of these are situated in islands? On continents? What number belongs to Europe? To Asia? To Africa? To America? To Oceania? 151. Number of volcanic regions in the Andes? By what names known are these regions separated? 152. Volcanic range of Chile? Between what parallels it extend? For what remarkable?

*The description of the volcanic regions contained in this lesson is derived principally from "Lyell's Principles of Geology."

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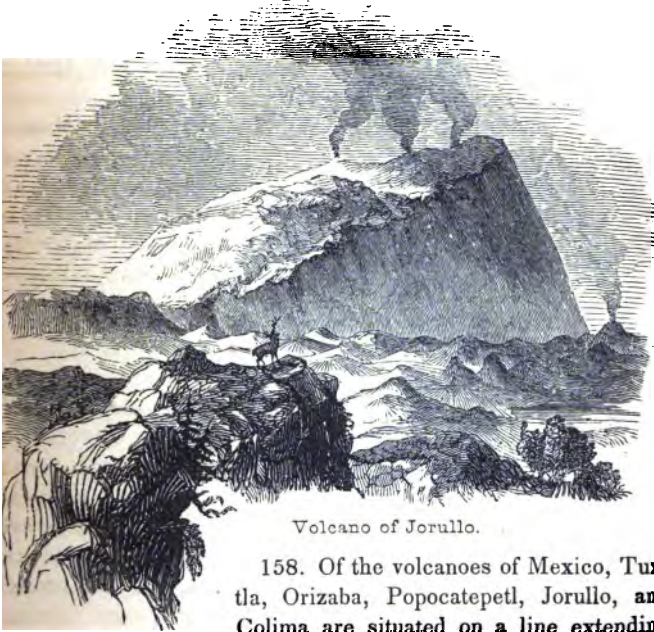
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ousand feet wide, surrounding Tunguragua, in Quito, were filled with mud from this source to a depth of six hundred feet.

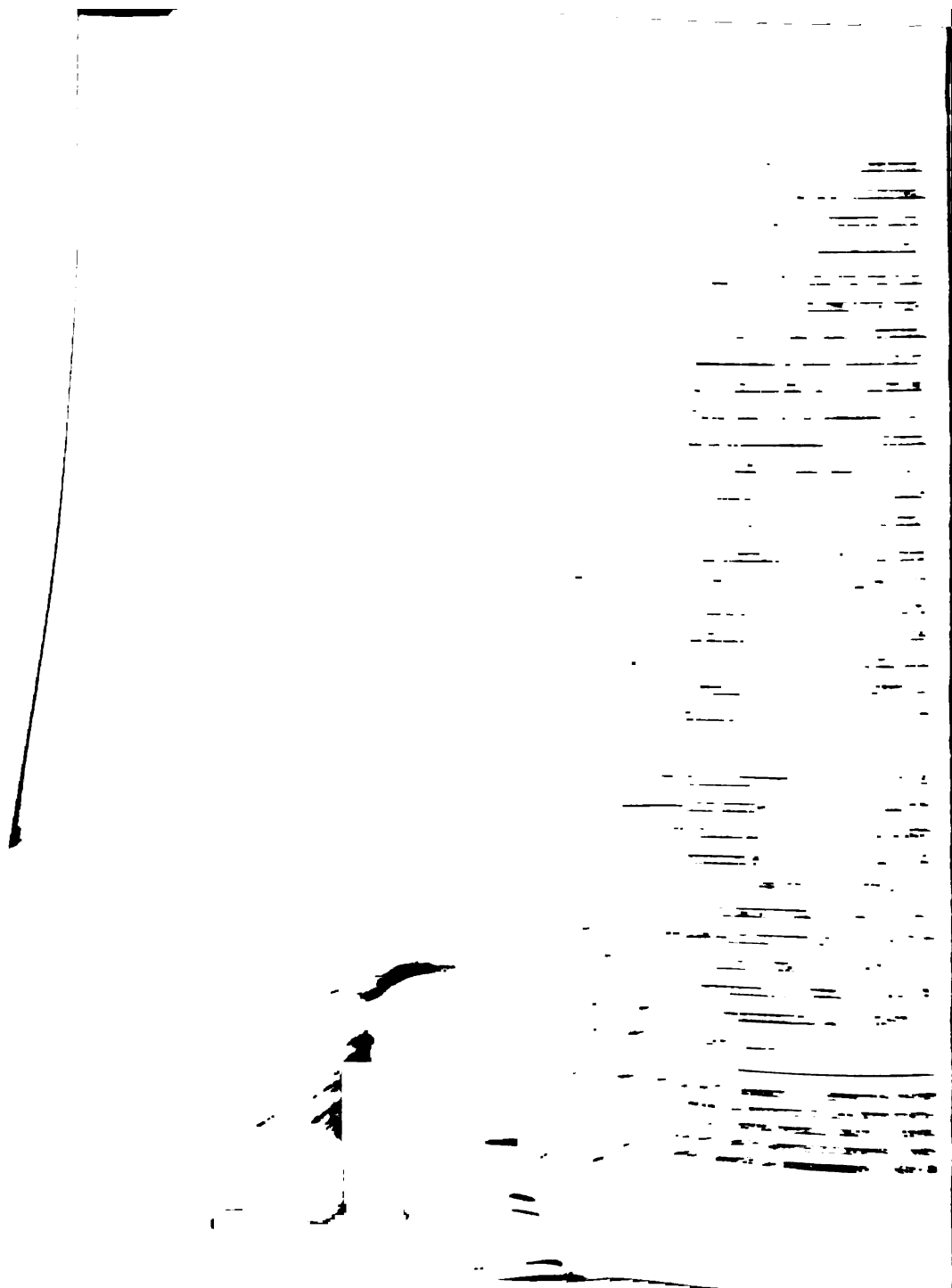
157. VOLCANOES OF NORTH AMERICA.—Proceeding north from the Isthmus of Panama, we find extensive volcanoes scattered through Central America and Mexico. Coseguina, in the former country, was in eruption in 1835, and some of its ashes fell at Truxillo, on the shores of the Gulf of Mexico. The amount of ashes thrown out by this eruption was so great, that twenty-four miles to the southward they covered the ground to the depth of three yards and a half, destroying the woods and dwellings. Thousands of cattle perished, and the streams were strewn with dead fish.



Volcano of Jorullo.

158. Of the volcanoes of Mexico, Tuxtla, Orizaba, Popocatepetl, Jorullo, and Colima are situated on a line extending from west to east, near the parallel of 19° north latitude. If this line be prolonged in a westerly direction, it cuts the volc

Questions.—157. Volcanoes north of the Isthmus of Panama? Coseguina? Ashes thrown out? 158. Volcanoes in Mexico? How situated? Volcanoes in the State of California? What volcano reported to have been found farther north?



162. It is supposed the northern extremity of this extensive volcanic region is in the borders of Cook's Inlet, northeast of the peninsula of Alaska, where one volcano, in about the sixtieth degree of latitude, is said to be 14,000 feet high. Alaska contains cones of vast height, which have been seen in eruption, and which are covered for two thirds of their height downward with perpetual snow.

163. From Alaska the line is continued through the Aleutian, or Fox Islands, to Kamtchatka. On this peninsula are many active volcanoes, which, in some eruptions, have scattered ashes to immense distances. Of these, the largest is Kliuchevsk, latitude 56° north, which rises at once from the sea to the prodigious height of 16,512 feet.

164. The Kurile chain of islands constitutes the prolongation of this range, which is continued through Jesso, Nippon, Loo-Choo, and Formosa to the Philippine Islands and the Moluccas.

165. Java is said to contain thirty-eight considerable volcanoes, some of which are more than 10,000 feet high. They are remarkable for the quantity of sulphur and sulphurous vapors which they discharge. They rarely emit lava; but rivers of mud issue from them. There are numerous extinct craters on the island of Java, filled with water which is strongly impregnated with sulphuric acid. The streams flowing from them support no living creature.

166. The Indian and Pacific oceans contain a great number of volcanic islands, interspersed with those of coral formation. The former are lofty, and present evidence that they have been undergoing upheaval in modern times; the latter are very low, consisting of reefs of coral, usually with lagoons, or lakes, in their centers.

167. VOLCANIC REGIONS OF THE MEDITERRANEAN.—Of the

Questions.—162. Situation of the northern extremity of this volcanic region? What of the volcanoes of Alaska? 163. Course of the volcanic line from Alaska? Volcanoes of Kamtchatka? Kliuchevsk? 164. Through what chain of islands is the range prolonged? Through what other islands is the chain continued? 165. Number of volcanoes in J? For what are they remarkable? Ejected matter? Extinct craters? 166. Extent of ones in the Indian and Pacific oceans? How interspersed? Character of the volcanic islands of the coral islands? 167. Volcanic regions of the Mediterranean? Samian Isles? Vesuvius and Etna? Through what countries does this volcanic extend on the east? On the west?

VESUVIUS.

43
 volcanic regions lying on the Mediterranean Sea, as
 those of Greece and Italy, with the adjacent islands. In the
 Grecian Archipelago is the island of Santorin, a grand center of
 volcanic action.

The Ionian Isles are continually covered
 by Vesuvius and Etna—the former in southern Italy, and the latter
 in the island of Sicily—are among the most remarkable volca-
 nes in the world. The volcanic region which traverses the
 southern shore of the Mediterranean is supposed to extend in
 the west through Asia Minor, and the countries bordering on the
 Chinese Sea to Central Asia, and on the west, through the south-
 ern part of Spain and Portugal to the Azores.

LESSON IV.

VESUVIUS, ETC., ETC.



is situated about six miles from a large town, and is an island subject to earthquakes and volcanic action.

convulsions, some of which have produced great devastation in the surrounding districts.

169. The following description of its crater is by an American* who visited it in 1851:

"After passing through thick clouds of steam charged with the suffocating sulphurous acid gas which greatly annoyed our lungs, when the wind cleared our vision we found ourselves on the narrow rim of the great crater. It was so narrow that only two persons could walk upon it abreast. . . . On this narrow rim, we walked on a surface not more than six or eight feet wide, with the terrific crater, 1,000 feet deep, on one side, and the abrupt descent of 1,800 feet on the other side, into the valley of Somma. It was a spectacle truly sublime, awfully grand and appalling. The heat below sent up, in throes and spasms, dense clouds of steam and sulphurous acid gas, which, at short intervals, filled the crater, and all that appeared was a pillar of a cloud, in which we were often involved and half suffocated; we stood with arms locked, for then it was unsafe to move until a whirlwind swept the crater clear, and we could see into its profound abyss.

170. "Nothing could be more perfectly formed than this crater. It was a magnificent hollow cone, whose nether apex opened into the great world of fire below; still the fire we did not see, although we had the most decisive proof of its existence and continued action in the violent ejection of steam and gas, filling every few minutes this vast funnel, whose diameter across from side to side was probably 1,000 feet; but the dense cloud of steam and noxious gas which hovered to leeward over a large portion of the circular orifice, rendered it impossible to walk around it, or even to ascertain whether a continuity of surface, free from cross fractures and chasms, would render it practicable without the most imminent danger."

171. The most recorded eruption of Vesuvius is that which occurred in the year of our Lord 79, and by which the cities of Pompeii and Herculaneum were destroyed.

As we know nothing of that sad catastrophe, but the sites of those cities are now unknown, and it was not until the last century that Herculaneum, which was discovered in 1711, lies five miles immediately adjacent to the eastern shores of the bay, and is now covered by the large modern village of Resina. Pompeii, situated farther to the southeast, twelve miles distant from Herculaneum, part of it has been cleared from the ashes under which it was buried, and it exhibits to view the full picture of

of the crater's rim? Its depth? Clouds of steam? 170. F
fire? Diameter of the funnel? What other facts are
of the eruption of Vesuvius? What cities were destroyed
where situated? Pompeii, when discovered
found?

* Professor B. Silliman.

... temples, theaters, halls, private habitations, the
... of the different ... the implements with which they were carried
and even the ... upon which these were employed.



Vesuvius.

173. In the vicinity of Naples there are other evidences of the
... character of this district. Numerous hot baths abound,
... with steam and water from the vents in the earth. The
... is the name of a nearly extinguished volcano, giving
... usually to aqueous vapor, together with sulphurous and
... gases, like those which escape from Vesuvius.

— This celebrated volcano is situated on the east-
... the island of Sicily. It rises near the sea in soli-
... to the height of nearly eleven thousand feet. Its
... circular, and is about eighty-seven English miles
... Its summit is about thirty miles from the
... south.

... down to history of any volcano.
... years B. C. Here, according
... bolts of Jupiter were forged;

... character of the district around Naples?
... situated? Its height? Form and cir-
... known eruption? What events did
... frequent eruptions?

ere, also, was raised a temple to Vulcan, where the fire never ceased to burn. From the above-mentioned date, during the whole subsequent period, it has been subject to periodical convulsions, with intervals of repose varying greatly in duration.

Recorded eruptions of Etna are . . .	B. C. 480— 427, interval	58 years.
“ “ . . .	B. C. 427— 396, “	31 “
“ “ . . .	B. C. 396— 140, “	256 “
“ “	between B. C. 140— 122, four eruptions.	
“ “	B. C. 122— 56, interval	66 years.
“ “	between B. C. 56 & 38, three eruptions.	
“ “	B. C. 38—A. D. 40, interval	78 years.
“ “	A. D. 40— 251, “	211 years.
“ “	A. D. 251— 812, “	561 “
“ “	A. D. 812—1169, “	357 “

From this period to the present the agitations of Etna have increased in frequency and power :

Twelfth and thirteenth centuries	8 eruptions.
Fourteenth	2 “
Fifteenth	4 “
Sixteenth	3 “
Seventeenth	8 “
Eighteenth	14 “
Nineteenth to 1832	6 “

76. The most remarkable eruption of Etna in modern times occurred in 1669. It was preceded by an earthquake which leveled to the ground all the houses in Nicolosi, a town situated twenty miles distant. A fissure, six feet broad, and of unknown length, opened with a loud crash, and ran to within a mile of the summit. A stream of lava flowed down the side of the mountain, and, after destroying fourteen towns and villages, overwhelmed a part of the city of Catania. This mass, at its entrance into the sea, was six hundred yards broad and forty feet deep. The solid contents of this immense stream of lava is estimated at 93,838,590 cubic feet.

77. VOLCANOES OF ICELAND.—Iceland, in the North Atlantic, seems to form a volcanic region by itself. From the beginning of the twelfth century, there is clear evidence that, during the whole period, there has never been an interval of more than for

Questions.—176. Eruption of 1669? How preceded? Destruction caused? Amount? 177. Iceland? Frequency of eruptions? Energy of volcanic action? Ravages? New islands?

[illegible]

1. The first step in the process is to identify the problem or issue that needs to be addressed. This involves gathering information and understanding the context of the problem.

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4. The fourth step is to implement the plan. This involves putting the strategy into action and monitoring progress along the way. It is important to stay flexible and make adjustments as needed.

5. The final step is to evaluate the results of the project. This involves assessing whether the objectives were met and identifying any lessons learned for future projects.

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 二、经济
 三、文化
 四、教育
 五、军事
 六、外交
 七、宗教
 八、法律
 九、道德
 十、艺术
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in Iceland, about thirty-six miles from Hecla. Geysers are not constantly active; few of them play longer than five or minutes at a time, although sometimes half an hour. The eruptions are often after intervals of a day or two.

11. The Great Geyser has a basin at its summit sixty feet in diameter, and six or seven deep. At the bottom of the basin is a well or funnel, ten feet wide at the mouth, but gradually narrowing to seven or eight, with a perpendicular descent of twenty feet. The eruptions are preceded by subterranean noises like the distant firing of cannon, and shakings of the earth. The sound then increases and becomes more violent, till at length a column of water is thrown up to the height of one or hundred feet. After the water ceases to play, a column of steam, rushing up with amazing force and thundering sound, terminates the eruption.*

LESSON XVI.

EARTHQUAKES.

12. EARTHQUAKES appear to be due to the same cause which produces a volcanic eruption, namely, the energy of elastic vapour struggling to find a vent from beneath the surface of the earth. They are most common in volcanic districts; but those at a greater distance from volcanoes are more violent, as if the latter afforded passage for the eruptive energy, which, at other times, cracked and upheaved the surface in effecting its disengagement.

13. The best proof that earthquakes and volcanoes have a common origin is the constancy with which they attend each other. The following examples are selected in illustration.

The same night Lima was destroyed by an earthquake, four new volcanoes were found in the Andes. Soon after the earthquake at Lisbon.

*—181. Give particulars of the Great Geyser. Describe the eruptions. How do earthquakes appear to be due? Where most common? Where most violent? 182. Best proof that volcanoes and earthquakes have a similar origin? Examples are given in illustration?

0 miles. The rise upon the coast was from —at the distance of a mile inland it was sup-
 ly twice as many. It has been conjectured
 r which this permanent alteration of level ex-
 been equal to 100,000 square miles.

us instances of the depression of land have oc-
 the great earthquake at Lisbon, in 1755, the new
 and its place was occupied by water 600 feet
 J, a region of 2,000 square miles, near the mouth
 embracing the Fort of Sindree, was submerged,
 and, a mound near by, rising as a compensating

s or fissures are frequently formed by earthquakes,
 uses, trees, animals, and men have been engulfed in
 the earth sometimes closing up, and no vestige of
 ning on the surface. The great earthquake of Cala-
 33, furnished numerous instances of such chasms.

ne neighboring waters of the ocean, during an earth-
 e strongly agitated. During the earthquake at Lisbon
 ave swept over the coast of Spain, and is said to have
 ty feet high at Cadiz. At Tangier, in Africa, it rose
 eighteen times on the coast: at Funchal, in Madeira, it
 teen feet perpendicular above high-water mark.

.. Earthquakes have caused an immense destruction of life
 roperty, and in some parts of the world, as in South Amer-
 ne inhabitants are in constant apprehension of danger.

3. During the earthquake which visited Peru, in 1746, 8,800 of the in-
 tants perished. In 1797, Peru was visited by another earthquake, on
 sh occasion 16,000 persons perished. The earthquake at Caracas, in
 2, destroyed 10,000 inhabitants. The great earthquake at Lisbon, in
 5, destroyed 60,000 persons in the course of about six minutes. The
 nber of persons lost during the earthquake in the two Calabrias and
 ily, in 1788, is estimated at 40,000, and about 20,000 more died by epi-
 nics which resulted from it.

Questions.—193. Give the examples of permanent land depression. 193. What is
 clefts or fissures? 194. Example of oceanic movements caused by earthquakes?
 al effects of earthquakes? 196. Number of persons who perished during the
 ke of Peru, in 1746? In 1797? During the earthquake at Caracas, in 1819?
 earthquake at Lisbon, in 1755? During the earthquake of the two Calabrias, 1



the purest that can be obtained except by distillation and well water contain many earthy substances in the brackish taste of wells in countries abounding with iron owing to the presence of that substance. River-water character determined by the soil and vegetation of the country through which it flows.

The waters of the globe are divided into the fresh and salt waters. Fresh waters include those of all streams and rivers, the springs, and the greater number of lakes and swamps. They are so called because they contain no amount of saline matter unfitting them for use. It is supposed that the lakes of North America contain more than half the amount of water on the face of the globe.

Salt water is that which fills the vast basins of the ocean besides numerous lakes and springs: it forms by far the greater portion of the liquid element. The proportion of saline matter which the ocean contains is about $3\frac{1}{2}$ per cent. The principal salts contained in sea-water are common salt (chloride of sodium), Glauber's salt (sulphate of soda), Epsom salt (sulphate of magnesium), chloride of magnesium, sulphate and carbonate of lime, common salt being the most considerable in amount. Supposing the sea to have a mean depth of 1,000 feet, it has been calculated that the amount of common salt it would contain would be equal, in extent, to five times the mass of the Alps, or one-third less than that of the Himalaya Mountains.

202. Oceanic waters in different places vary in the quantity of saline matter they contain. From various observations, it appears that the degree of saltiness diminishes toward the poles, and increases toward the shores. This is owing to the melting of snow and ice, and the volumes of fresh water poured in by the rivers. It is ascertained that the waters of the southern hemisphere contain more salt than those of the northern, while the Atlantic Ocean is saltier than the Pacific.

How are the waters of the globe divided? What do the fresh waters they so called? What is said of the lakes of North America? What proportion of saline ingredients does it contain in sea-water? Which is the most considerable in amount? How do oceanic waters vary? Where is the saltiness of the ocean unequal? Between what other regions is the saltiness unequal?

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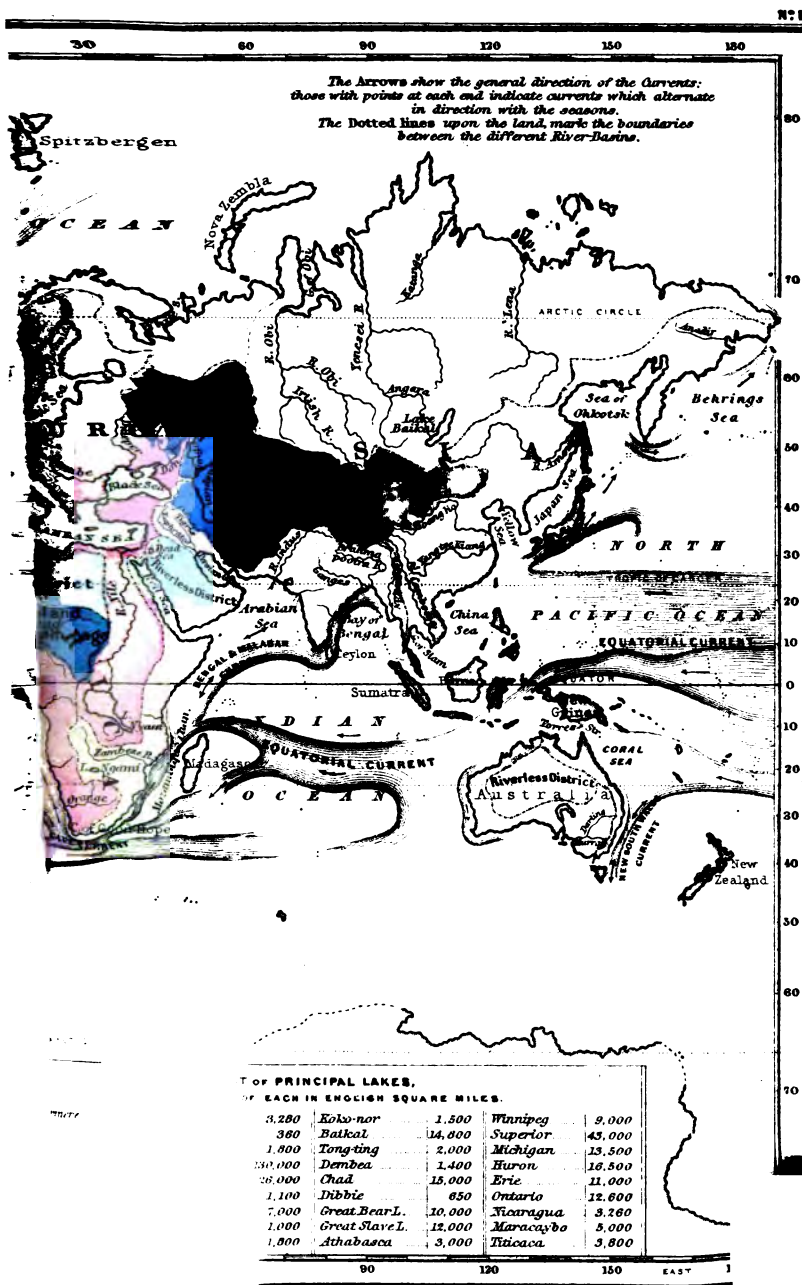
5. The final step is to evaluate the results of the project. This involves assessing the outcomes against the objectives and goals and identifying any areas for improvement.

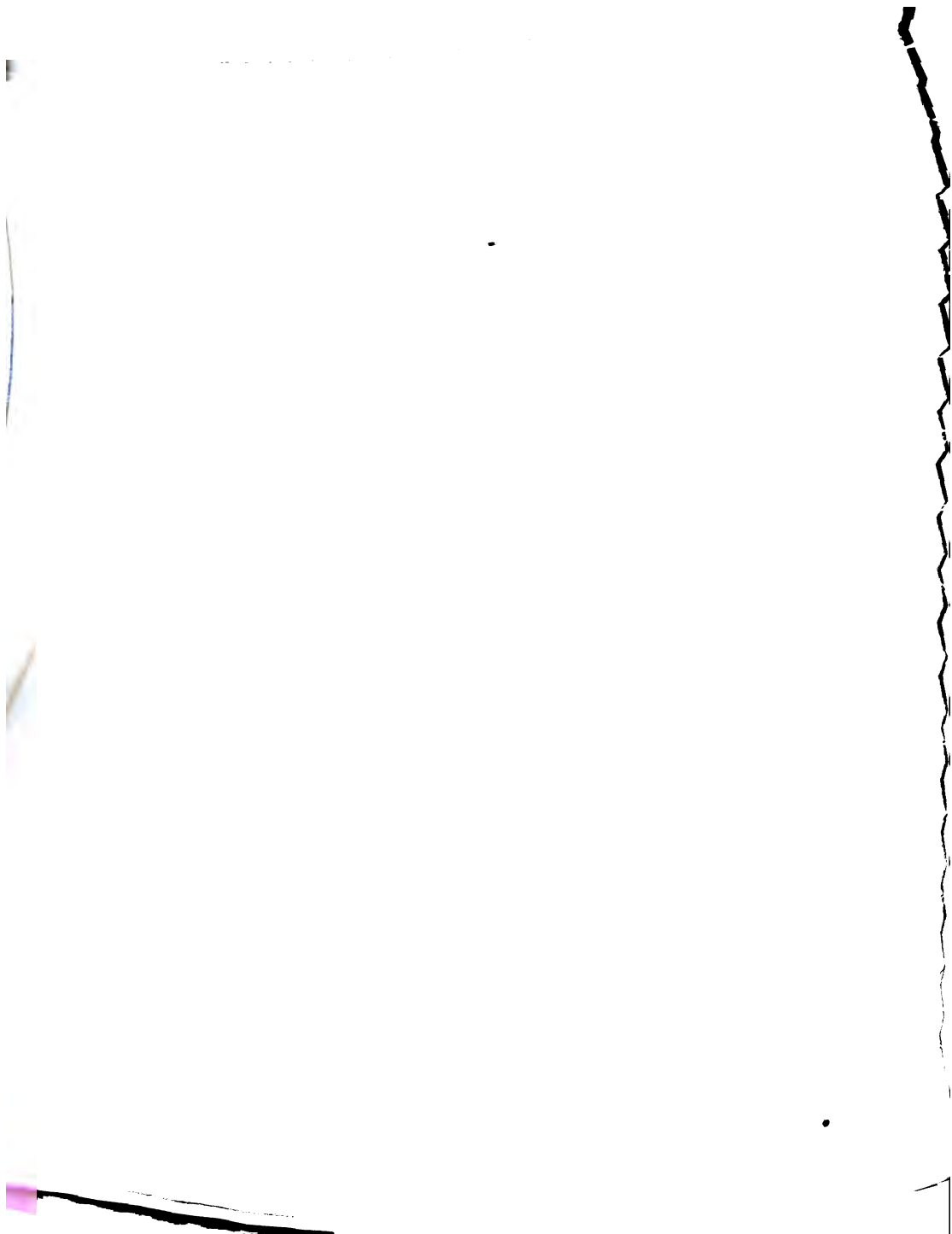
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LESSON II.

MINERAL SPRINGS.

206. **MINERAL** waters may be divided into four classes : (1) **acidulous**, such as contain carbonic acid ; (2) **chalybeate**, or **springs holding** in solution either the carbonate or the sulphate of iron ; (3) **sulphurous**, or springs containing either sulphureted hydrogen, or sulphate of lime, etc., and which are distinguished by their repulsive smell ; and (4) **saline**, or springs holding in solution a considerable portion of neutral salts, which render them hard, and impart to them a disagreeable taste, unfitting them for a beverage, or for culinary purposes.

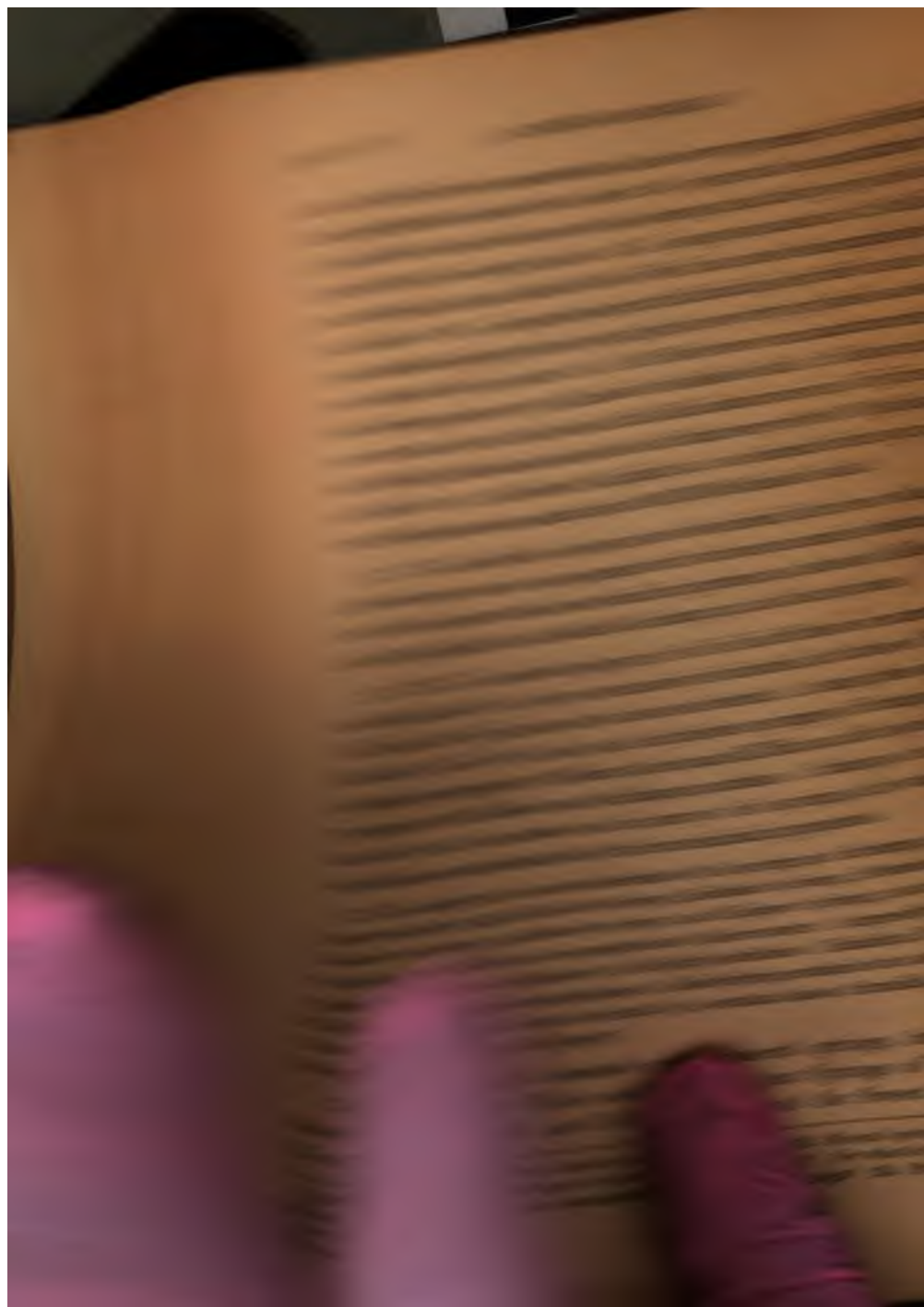
207. *Acidulous* waters present a sparkling appearance which they owe to the presence of carbonic acid gas. This gas is very plentifully disengaged from springs in almost all countries, but more particularly in the vicinity of active or extinct volcanoes. Acidulated waters sparkle when poured from one vessel into another. A remarkable spring containing water of this description occurs in Asia Minor, near Kiz-hisar, which rises very cold, but bubbles up exactly like a boiling caldron. A small river in South America, a tributary of the Magdalena, which rises in a volcanic mountain, has its waters so greatly impregnated with this gas, that the Spaniards call it *Vinagré* (*vinegar*).

208. *Chalybeate* springs are such as contain oxide of iron ; the term is, however, occasionally applied to springs containing bituminous. The springs at Tonbridge Wells, and Brighton, belong to this class.

Sulphurous springs are so named because they contain sulphur, which usually occurs in the form of sulphureted hydro-sulphate of lime. Of the springs of this class are Rowgate, and St. Bernard's Well, England. Sulphurous springs are very numerous in volcanic countries.

Saline springs contain a greater or less proportion of chlorides.

Mineral waters, how divided ? Acidulous ? Chalybeate ? Sulphurous ?
 Appearance of acidulous waters ? Carbonic acid gas ? Spring near
 South America ? 208. Chalybeate springs ? Examples. 209. Ex-
 amples. Where numerous ? 210. Saline springs ? Quantity of salts
 Springs at Salina and Syracuse ? On the Great and Little Kai



ty, Hot and Warm in Bath, Berkley in Morgan, Fauquier
e Sulphur in Fauquier, Shannondale in Frederick, Alum in
bridge, Jordan's White Sulphur in Frederick, Red in Alle-
y, Grayson in Carroll, Botetourt in Roanoke, Holston in
, Augusta Springs and Daggus Springs in Botetourt.

LESSON III.

RIVERS.

5. RIVERS commonly take rise in springs, lakes, or the
ed ice and snow of ele-
l mountains. The smaller
ms which unite to form
, are variously called rills,
ets, and brooks. Though
s frequently rise in lakes,
ring from small elevations,
reat storehouses from which
nightiest streams are fed are
ce-clad mountains of table-
t.



Lodore Waterfall

6. The *basin* of a river
prehends the entire country
ed by it and its tributaries.

ated land separating

from another is called the *water-parting* or *watershed*,
he ridge of a house-roof affords an illustration. This
s a lofty range of mountains, as the Alps, streams
flow into opposite and distant seas. But commonly
ng has no great elevation, a slight rise of the sur-
ficient to separate streams whose mouths are thou-

Where do rivers commonly take their rise? What are the great
they are fed? 216. What is the basin of a river? The water-
hat elevated water-parting is mentioned? Have water-parting
tion? What rare example is mentioned of two river basins being
le natural channel?

hundreds of miles apart. South America presents the rare case of two river-basins connected by a navigable natural channel. This is caused by the river Orinoco branching off in one course and proceeding by different channels to the sea.

217. South America is remarkable for containing the largest river-basin in the world, that of the Amazon, measuring 2,775,000 square miles. Next to it, in point of extent, is the basin of the Mississippi and Missouri, in North America, measuring 1,333,000 square miles. The greatest river-basin in Asia is that of the Yangtze, 1,240,000 square miles; the greatest in Africa is that of the Nile, 1,240,000 square miles; and the greatest in Europe is that of the Volga, 528,000 square miles.

The course of rivers is commonly winding. In some cases it is so tortuous that its actual length is three times that of a straight line drawn from its source to its mouth, as the Forth in Scotland; in others, as the Hudson, it is mainly straight. The Mississippi River is remarkable for its windings, or bends, as they are locally called.

218. In 1848, the Racoon River, an artificial channel, was cut in this stream a little below the mouth of the Red River. It is about 30 miles in length, and a common steamboat can run through it in about 24 hours in going up, and 12 hours in coming down. It is a narrow channel, and is so widened at intervals by the use of gates.

forest will go down root foremost, and the tops of them appear.

The actual meanderings of the Missouri and the Mississippi or the difference between the direct distance from the mouth of the former to the mouth of the latter and that by their meanders, is estimated at 2,148 geographical miles. The meanderings of the other principal streams, including that of their tributaries, are given approximately in the following table:*

Rivers.	Meandering.
Rhine.....	240 geographical miles.
Elbe.....	340 " "
Rhone.....	352 " "
Dnieper.....	532 " "
Don.....	552 " "
Danube.....	616 " "
Ganges.....	856 " "
Indus.....	864 " "
Euphrates.....	892 " "
La Plata.....	892 " "
Nile.....	920 " "
Orinoco.....	984 " "
Lena.....	1,004 " "
Obi.....	1,044 " "
Mackenzie.....	1,156 " "
Hoang-Ho.....	1,160 " "
Volga.....	1,440 " "
Amazon.....	1,562 " "
Yenesei.....	1,572 " "

221. The windings of rivers greatly augment their utility, by affording facilities for a more extended intercommunication, and by diminishing that velocity of current which would otherwise be such, in many streams, as to prevent their being bridged or navigated with safety. This arrangement affords a striking evidence of the wisdom and goodness of the Creator.

Ques.

Uses of the Mississippi? Other rivers? 221. How do the winds augment their utility? How must we regard this arrangement?

Principal rivers of the world, including their meanders, &c.



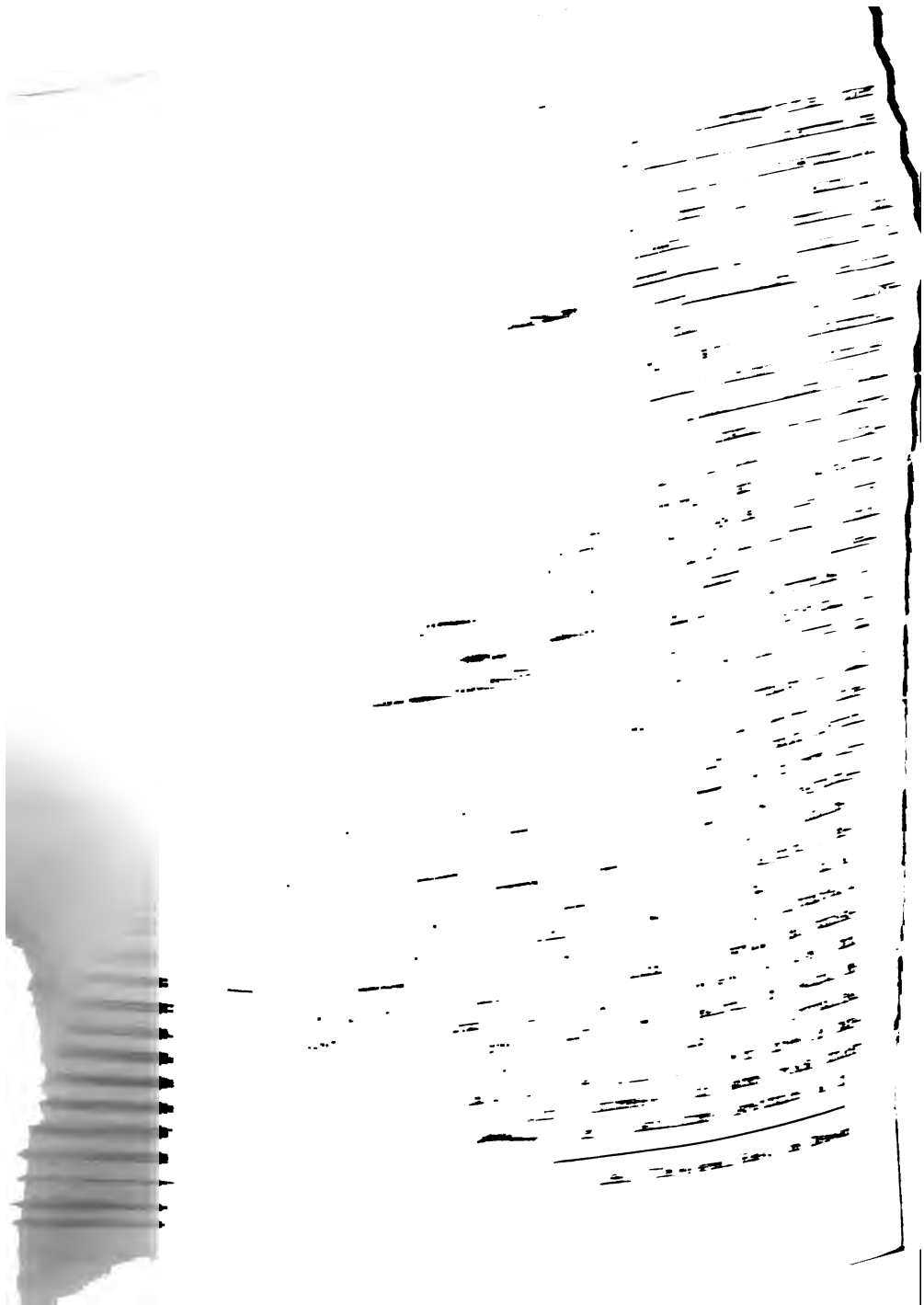
arters of a mile wide, after forming a succession of rap-
suddenly to a depth of 153 feet. The cataract is divided
Island into two parts. The largest of these, on the
side, called, from its shape, the Horse-Shoe Fall, is
et, more than one third of a mile, broad, and 153 feet in
The fall, on the American side, is 600 feet in breadth
feet in height. A cloud of mist points out the locality
cataract, and, under favorable circumstances, its roar may
rd, it is said, at a distance of 40 miles.



Falls of the Missouri.

226. The Falls of St. Anthony, in the Mississippi, about 400
les from its en and just above the mouth of the St. Peters,
nd near' of the navigation of that stream. They
ve a d 7 to 20 feet, and are thus described by a
ent to the falls, the river is about six hundred
side in escent, it is divided by Cataract Island,
ed with trees and shrubbery. All around
below, are strewn huge masses of lime
Titanic confusion, and attesting the mig
which they seem to be contending."

ive particulars of the Falls of St. Anthony.



andous cataract which, since the creation, has been lavishing magnificence on the desert, unknown to civilization.

1. The principal water-
of the Eastern Conti-
are Terni, Italy, a
of the Velino, of 300
usually regarded as the
European cataract;
bach, near Lauterbrun-
in Switzerland, a per-
icular descent of 800
; Rhinefall, near Schaff-
en, a fall of the river
ne in three distinct
ches over a precipice
ards of 80 feet high;
chenbach, canton of
n, a series of six falls,
unting to 1,000 feet;
ne, a small river of Ba-



Reichenbach,

ia, descending in five falls 2,000 feet; Evanson, a torrent of
unt Rosa, 1,100 feet; Cauvery, southern India, two grand falls
r Seringapatam, 810 feet; Girsupah, near a town of that name
the western Ghauts, a single fall of a considerable stream,
2 feet.

LESSON V.

(continued).

tern

is commonly by a single mouth,
Lawrence and the Hudson; but
in alluvial regions, carry along
which they deposit at their mouths.
and dividing the main stream int

The following falls and rapids: Terni, Stanbac
Cauvery, Girsupah. 230. Termination of rivers

These formations are called *alluvium* from the alluvion, the shape of the flood after a rain.



100. The alluvium of the Mississippi contains a very large quantity of sand and gravel for 50 miles on the Gulf of Mexico, at the end of which are numerous channels. The alluvium has been given the deposit of the sand and gravel brought down by the Mississippi stream. The permanent advance of the alluvium is supposed to be

101. The Mississippi contains in the mean annual average of the alluvium of the Mississippi contains is a very large quantity of sand and gravel, which is about 1/100 of the weight of the water. The quantity of solid matter brought down by the river is 3,704,756,400 cubic feet, which would cover one and eleven miles square.



102. The volume of the alluvium is a very large quantity of sedimentary matter, particularly being the remains of plants, which form about 1/100 of the weight. The alluvium is composed of sand and gravel, which is brought down by the Mississippi stream. The permanent advance of the alluvium is supposed to be

103. The alluvium of the Mississippi contains a very large quantity of sand and gravel, which is about 1/100 of the weight of the water. The quantity of solid matter brought down by the river is 3,704,756,400 cubic feet, which would cover one and eleven miles square.

charged is estimated at 6,368,077,440 cubic feet, a in weight and bulk, it has been calculated, to eighty- great pyramids of Egypt. The Hoang-Ho, which the great alluvial plain of China, is supposed to bring ne hour 2,000,000 cubic feet of earth, which so thick- colors the ocean by its discharges as to originate the ae Yellow Sea.

Rivers are grouped into two grand classes, the oceanic continental. *Oceanic* rivers are those which flow direct ocean, or into waters communicating with it. They distinct systems, belonging respectively to the Arctic, Pacific, and Indian oceans.

I. SYSTEM OF THE ARCTIC OCEAN.

Course.	Termination.	Length in English Miles.
..... Eastern Siberia	Arctic Ocean	2,400
..... Northern Siberia	Ditto	1,150
..... Central Siberia	Ditto	2,900
..... Western Siberia	Gulf of Obi	2,530
..... Northern Russia	Arctic Ocean	695
..... Ditto	White Sea	760
..... British America	Arctic Ocean	2,160

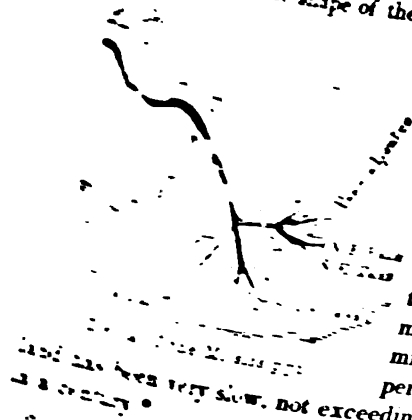
II. SYSTEM OF THE ATLANTIC OCEAN.

..... Northern Russia	Gulf of Finland	45
..... Poland, Prussia	Baltic Sea	630
..... Germany	German Ocean	690
..... Switzerland and Germany	Ditto	760
..... France	Bay of Biscay	570
..... Switzerland, France	Mediterranean	490
..... Austrian Empire, Turkey	Black Sea	1,630
..... Southern Russia	Ditto	1,200
..... Ditto	Ditto	1,100
..... Abyssinia, Nubia, Egypt	Mediterranean	2,600
..... Western Africa	Atlantic Ocean	900
..... Ditto	Gulf of Guinea	2,300
..... Southern Africa	Atlantic Ocean	1,050
..... British America	Hudson's Bay	1,920
..... Ditto	Atlantic Ocean	2,000
..... Central North America	Gulf of Mexico	400
..... Ditto	Ditto	100

Grouped? Oceanic rivers? Systems? Name the p
of the Arctic Ocean. Atlantic Ocean. Pacific O.

RIVERS.

Such formations are called *deltas*, from their resemblance to the shape of the Greek letter Δ (delta).



231. The delta of the Mississippi consists of a long narrow tongue of land protruding for 50 miles into the Gulf of Mexico, at the end of which are numerous channels of charge. This extensive formation has been produced by the deposit of the sedimentary matter brought down by the mighty stream. The rate of permanent advance of the delta is very slow, not exceeding, it is supposed, one inch in a century.

It has been calculated that the mean annual amount of sediment which the water of the Mississippi contains is about 300,000,000 cubic feet, and that it is equal to about 1/100 of its weight. It has also been estimated that the quantity of solid matter brought down by the river is 3,702,758,400 cubic feet, which would cover over eleven miles square to a depth of six feet.



233. The waters of the Gulf contain a very large quantity of sedimentary matter, particularly during the rainy season.

in bulk, or 577

of the sediment
in the Gulf of Mexico

982. Proportion of sedimentary matter

and discharged is estimated at 1,385,777,440 cubic feet, a equal in weight and bulk, it has been estimated to equal of the great pyramids of Egypt. The Huang-Ho, which runs the great alluvial plain of China, is supposed to bring in one hour 2,000,000 cubic feet of earth, which so thickens and colors the ocean by its discharges as to originate the of the Yellow Sea.

IV. Rivers are grouped into two great classes, the oceanic the continental. Oceanic rivers are those which flow direct to the ocean, or into waters communicating with it. They are four principal systems, belonging respectively to the Arctic, Atlantic, Pacific, and Indian oceans.

I. SYSTEM OF THE ARCTIC OCEAN.

Course.	Termination.	Length in English Miles.
Eastern Siberia	Arctic Ocean	2,400
Northern Siberia	Ditto	1,150
Central Siberia	Ditto	2,900
Western Siberia	Gulf of Obi	2,530
Northern Russia	Arctic Ocean	695
Ditto	White Sea	760
British America	Arctic Ocean	2,160

II. SYSTEM OF THE ATLANTIC OCEAN.

Northern Russia	Gulf of Finland	46
Poland, Prussia	Baltic Sea	630
Germany	German Ocean	690
Switzerland and Germany	Ditto	760
France	Bay of Biscay	570
Switzerland	Mediterranean	450
Spain	Black Sea	1,000
Ditto	Ditto	1,200
Ditto	Ditto	1,100
Mediterranean	Ditto	2,000
Spain	Ditto	900
Spain	Ditto	2,300
Spain	Ditto	1,500
Spain	Ditto	1,500
Spain	Ditto	2,500
Spain	Ditto	4,000
Spain	Ditto	1,000

18? Name the rivers of the Atlantic Ocean. Pacific Ocean.

RIVERS.

Rivers.	Course.	Termination.	Length in English Miles.
Magdalena	New Granada	Caribbean Sea	860
Orinoco	Venezuela	Atlantic Ocean	1,200
Amazon	Brazil	Ditto	3,900
Araguay	Ditto	Ditto	1,300
St. Francisco	Ditto	Ditto	1,500
Plata	Ditto	Ditto	2,350

III. SYSTEM OF THE PACIFIC OCEAN.

Amour	Eastern Asia	Sea of Okhotsk	2,300
Hoang-Ho	China	Yellow Sea	2,600
Yang-tse-Kiang	Ditto	Ditto	3,200
Si-Kiang	Ditto	China Sea	1,110
Meinam	Siam	Gulf of Siam	900
Cambodia	Tibet, Cochin China	China Sea	2,000
Columbia	Oregon	Pacific Ocean	750
Colorado	Utah, New Mexico	Gulf of California	900

IV. SYSTEM OF THE INDIAN OCEAN.

Euphrates	Western Asia	Persian Gulf	1,600
Ganges	Ditto	Ditto	980
Indus	Northern India	Arabian Sea	1,700
Brahmapootra	Ditto	Bay of Bengal	1,460
Irrawaddy	Tibet, Assam	Ditto	2,000
Salween	Tibet, Birman Empire	Ditto	1,200
McKean	South Australia	Encounter Bay	1,280

35. *Continental* rivers are those which are confined exclusively to the continents, and discharge themselves into completely enclosed lakes, or are lost in sands, deserts, or swamps. The continental rivers are stated in the following table :

	Course.	Termination.
Volga	European Russia	Caspian.
Don	Georgia	Ditto.
Ural	Circassia	Ditto.
Amoo, or Jihoo	European and Asiatic Russia	Ditto.
Sir, or Sihoo	Turkestan	Lake Aral.
Helmund	Ditto	Ditto.
Jarkand	Chinistan	Lake Zurrah.
	Central Asia	Lake Lopnor.
	Many streams in Central Asia	terminate in insulated lakes,
	are lost in desert sands	

name the principal continental rivers, the coun-

Rivers.	Course.	Termination.
Jordan.....	Palestine.....	Dead Sea.
	Streams north of the African Sahara, lost in sands.....	
Rio Grande.....	Mexico.....	Lake Parras.
Desaguadero.....	Bolivia.....	Lakes and Swamps.
Humboldt's.....	Utah Territory.....	Lake.
Bear.....	Ditto.....	Great Salt Lake.
	Many other streams in Utah Territory are lost in sands, marshes, or lakes.	

236. The magnitude of rivers depends upon the area of their basins, the rain-producing character of the climate, and the arrangement of the surrounding mountains, with reference to the prevailing winds. Lieut. Maury thus accounts for the vast rivers of the South American continent: "The northeast and southeast trade-winds, as they come across the Atlantic, filled with moisture, go full charged into the interior, dropping it in showers as they go, until they reach the snow-capped summits of the Andes, where the last drop, which that very low temperature can wring from them, is deposited to melt and feed the sources of the Amazon and the La Plata, with their tributaries."

237. The proportional quantity of water discharged by some of the principal rivers has been estimated as follows:

Thames..... 1	Don..... 88	Obi..... 179
Rhine..... 13	Volga..... 80	Nile..... 250
Loire..... 10	Euphrates..... 60	St. Lawrence.... 112
Po..... 6	Indus..... 133	Mississippi..... 338
Elbe..... 8	Ganges..... 143	Plata..... 490
Vistula..... 12	Yang-tse-Kiang... 258	Amazon..... 1,280
Danube..... 65	Amour..... 166	
Dnieper..... 86	Lena..... 125	

238. Many rivers are subject to periodical inundations. It is to the annual overflowings of the Nile that Egypt owes her fertility. The rise commences about the 21st of June, attains its greatest height near the middle of September, and gradually diminishes to the time of the winter solstice. Both the Mississippi and the Missouri have annual floods during the spring month

Questions.—236. Upon what does the magnitude of rivers depend? The large r^r of South America? 237. State the proportional quantity of water discharged by some of principal rivers. 238. Inundations of rivers? Overflowings of the Nile? Of other riv^s

3

5

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1



Valley of the Mississippi, lying between the Rocky and Alleghany Mountains; (3) the region to the west of the Rocky Mountains, the streams of which are tributary to the Pacific Ocean; (4) the northern slope drained by streams tributary to Hudson's Bay and the Arctic Ocean.

242. The *Mississippi* is the largest of the North American rivers. It waters the southern half of the great plain, and brings to the sea the drainage of upward of a million of square miles. It rises in the small lake of Itasca, at an elevation of only 1,490 feet above the level of the sea, and flows in a southerly direction to its termination in the Gulf of Mexico, after a course of 2,500 miles. The Mississippi is navigable for 2,200 miles to the Falls of St. Anthony which occur at a distance of about 400 miles below its source.

243. The *Missouri* has its origin in the Rocky Mountains, and runs for 3,100 miles in a southeasterly direction before it joins the Mississippi, making a total distance, from its source to its entrance into the Gulf of Mexico, of more than 4,450 miles. It is navigable from the point where it unites with the Mississippi up to the base of the Rocky Mountains, where the Great Falls occur (in latitude $46^{\circ} 50'$).

244. During the period of the annual floods, large tracts of the adjoining country are overflowed, and immense damage done to property. Artificial embankments, called *levees*, are constructed along the lower course of the Mississippi to prevent inundation; but, in seasons of high floods, they are often broken through by the force of the waters, forming what are known as *crevasses*. About one fifth of the whole surface of the State of Louisiana is periodically overflowed.

245. The *Ohio* is, next to the Missouri, the most important of the tributaries of the Mississippi: it is formed by the junction of the Monongahela and the Alleghany rivers, which unite their waters at Pittsburg, where the river becomes navigable. The Ohio, about 950 miles in length, and from four hundred yards to upward of three quarters of a mile in breadth, f

Questions.—242. The Mississippi? Its source, direction, and termination? How navigable? 243. The Missouri? How far navigable? 244. Floods? Artificial embankments? 245. The Ohio? Its length, etc.? Falls?

SOUTH AMERICAN RIVERS.

1. The first of these is the fact of the existence of the universe.
 2. The second is the fact of the existence of the human race.
 3. The third is the fact of the existence of the human mind.
 4. The fourth is the fact of the existence of the human soul.
 5. The fifth is the fact of the existence of the human body.
 6. The sixth is the fact of the existence of the human spirit.
 7. The seventh is the fact of the existence of the human heart.
 8. The eighth is the fact of the existence of the human brain.
 9. The ninth is the fact of the existence of the human liver.
 10. The tenth is the fact of the existence of the human stomach.
 11. The eleventh is the fact of the existence of the human intestines.
 12. The twelfth is the fact of the existence of the human kidneys.
 13. The thirteenth is the fact of the existence of the human bladder.
 14. The fourteenth is the fact of the existence of the human lungs.
 15. The fifteenth is the fact of the existence of the human heart.
 16. The sixteenth is the fact of the existence of the human brain.
 17. The seventeenth is the fact of the existence of the human liver.
 18. The eighteenth is the fact of the existence of the human stomach.
 19. The nineteenth is the fact of the existence of the human intestines.
 20. The twentieth is the fact of the existence of the human kidneys.
 21. The twenty-first is the fact of the existence of the human bladder.
 22. The twenty-second is the fact of the existence of the human lungs.
 23. The twenty-third is the fact of the existence of the human heart.
 24. The twenty-fourth is the fact of the existence of the human brain.
 25. The twenty-fifth is the fact of the existence of the human liver.
 26. The twenty-sixth is the fact of the existence of the human stomach.
 27. The twenty-seventh is the fact of the existence of the human intestines.
 28. The twenty-eighth is the fact of the existence of the human kidneys.
 29. The twenty-ninth is the fact of the existence of the human bladder.
 30. The thirtieth is the fact of the existence of the human lungs.
 31. The thirty-first is the fact of the existence of the human heart.
 32. The thirty-second is the fact of the existence of the human brain.
 33. The thirty-third is the fact of the existence of the human liver.
 34. The thirty-fourth is the fact of the existence of the human stomach.
 35. The thirty-fifth is the fact of the existence of the human intestines.
 36. The thirty-sixth is the fact of the existence of the human kidneys.
 37. The thirty-seventh is the fact of the existence of the human bladder.
 38. The thirty-eighth is the fact of the existence of the human lungs.
 39. The thirty-ninth is the fact of the existence of the human heart.
 40. The fortieth is the fact of the existence of the human brain.
 41. The forty-first is the fact of the existence of the human liver.
 42. The forty-second is the fact of the existence of the human stomach.
 43. The forty-third is the fact of the existence of the human intestines.
 44. The forty-fourth is the fact of the existence of the human kidneys.
 45. The forty-fifth is the fact of the existence of the human bladder.
 46. The forty-sixth is the fact of the existence of the human lungs.
 47. The forty-seventh is the fact of the existence of the human heart.
 48. The forty-eighth is the fact of the existence of the human brain.
 49. The forty-ninth is the fact of the existence of the human liver.
 50. The fiftieth is the fact of the existence of the human stomach.
 51. The fifty-first is the fact of the existence of the human intestines.
 52. The fifty-second is the fact of the existence of the human kidneys.
 53. The fifty-third is the fact of the existence of the human bladder.
 54. The fifty-fourth is the fact of the existence of the human lungs.
 55. The fifty-fifth is the fact of the existence of the human heart.
 56. The fifty-sixth is the fact of the existence of the human brain.
 57. The fifty-seventh is the fact of the existence of the human liver.
 58. The fifty-eighth is the fact of the existence of the human stomach.
 59. The fifty-ninth is the fact of the existence of the human intestines.
 60. The sixtieth is the fact of the existence of the human kidneys.
 61. The sixty-first is the fact of the existence of the human bladder.
 62. The sixty-second is the fact of the existence of the human lungs.
 63. The sixty-third is the fact of the existence of the human heart.
 64. The sixty-fourth is the fact of the existence of the human brain.
 65. The sixty-fifth is the fact of the existence of the human liver.
 66. The sixty-sixth is the fact of the existence of the human stomach.
 67. The sixty-seventh is the fact of the existence of the human intestines.
 68. The sixty-eighth is the fact of the existence of the human kidneys.
 69. The sixty-ninth is the fact of the existence of the human bladder.
 70. The seventieth is the fact of the existence of the human lungs.
 71. The seventy-first is the fact of the existence of the human heart.
 72. The seventy-second is the fact of the existence of the human brain.
 73. The seventy-third is the fact of the existence of the human liver.
 74. The seventy-fourth is the fact of the existence of the human stomach.
 75. The seventy-fifth is the fact of the existence of the human intestines.
 76. The seventy-sixth is the fact of the existence of the human kidneys.
 77. The seventy-seventh is the fact of the existence of the human bladder.
 78. The seventy-eighth is the fact of the existence of the human lungs.
 79. The seventy-ninth is the fact of the existence of the human heart.
 80. The eightieth is the fact of the existence of the human brain.
 81. The eighty-first is the fact of the existence of the human liver.
 82. The eighty-second is the fact of the existence of the human stomach.
 83. The eighty-third is the fact of the existence of the human intestines.
 84. The eighty-fourth is the fact of the existence of the human kidneys.
 85. The eighty-fifth is the fact of the existence of the human bladder.
 86. The eighty-sixth is the fact of the existence of the human lungs.
 87. The eighty-seventh is the fact of the existence of the human heart.
 88. The eighty-eighth is the fact of the existence of the human brain.
 89. The eighty-ninth is the fact of the existence of the human liver.
 90. The ninetieth is the fact of the existence of the human stomach.
 91. The ninety-first is the fact of the existence of the human intestines.
 92. The ninety-second is the fact of the existence of the human kidneys.
 93. The ninety-third is the fact of the existence of the human bladder.
 94. The ninety-fourth is the fact of the existence of the human lungs.
 95. The ninety-fifth is the fact of the existence of the human heart.
 96. The ninety-sixth is the fact of the existence of the human brain.
 97. The ninety-seventh is the fact of the existence of the human liver.
 98. The ninety-eighth is the fact of the existence of the human stomach.
 99. The ninety-ninth is the fact of the existence of the human intestines.
 100. The hundredth is the fact of the existence of the human kidneys.

LESSON VI.

THE RIVER SYSTEMS OF THE WESTERN CONTINENT.

THE RIVER SYSTEMS OF THE WESTERN CONTINENT are rivers found in the western part of the continent of North and South America. The river systems of the western continent is owing to a variety of causes, as the formation and direction of the land, the position of the river basins, etc., have all a great influence on the river systems.

part which is
Ocean: (2) the

249. The principal rivers draining the region to the west of the Rocky Mountains—forming the third division—are the Fraser (500 miles), Oregon, or Columbia (1,300 miles), Sacramento (450 miles), and the Colorado (1,350 miles). Columbia, the most considerable of these, receives several important tributaries, the largest of which is the Lewis. The river Sacramento waters the northern half of the valley lying between the Sierra Nevada and the coast range of California, and forms at its mouth the harbor of San Francisco: immediately above this outlet it is joined by the San Joaquin, which drains the southern half of the valley, and carries off the waters of Lake Tule. The streams tributary to the Sacramento and San Joaquin, which flow from the east, drain the gold regions of California.

250. Of the streams draining the northern slope of North America two divisions may be made,—one embracing the Nelson, Churchill, and other rivers flowing into Hudson Bay; and the other, the Mackenzie, Coppermine, and other streams flowing into the Arctic Ocean. The most considerable of these streams is the Mackenzie which issues from the western extremity of the Great Slave Lake. During the summer, it pours a vast flood of waters into the sea; but is obstructed by ice during nine months of the year.

251. The Rio del Norte is a considerable stream of 2,000 miles in length, which rises in the southern part of the Rocky Mountains and runs in a southeasterly direction into the Gulf of Mexico. To the south of this stream are few rivers of any considerable length. The San Juan, in Central America, possesses considerable interest from its having hitherto afforded the most ready means of communication between the opposite shores of the Atlantic and Pacific oceans. It has its origin in the lake of Nicaragua, on the southern portion of the plateau of Guatemala, and, after a course of 120 miles, empties itself into the Caribbean Sea.

Questions.—249. The principal rivers draining the third division? The Columbia? Sacramento? San Joaquin? Gold regions, how drained? 250. What two divisions of the streams draining the northern slope? The Mackenzie? 251. The Rio del Norte? San Juan?

LESSON VII.

THE RIVER SYSTEMS OF THE WESTERN CONTINENT.

252. **SOUTH AMERICAN RIVERS.**—The three principal rivers of South America are the Orinoco, the Amazon, and the La Plata, which drain, respectively, the northern, middle, and southern portions of the great plain.

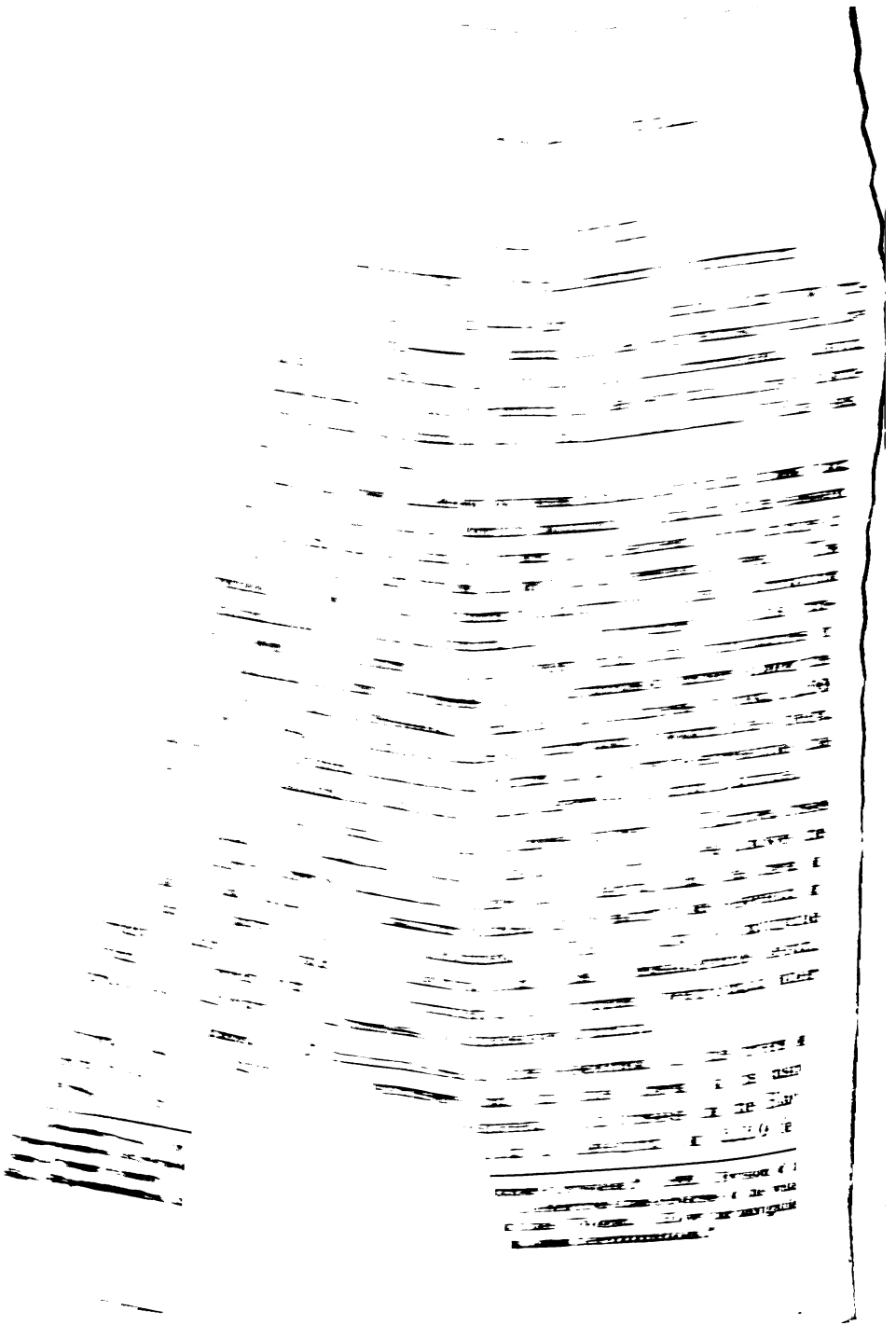
253. The *Orinoco*, nearly 1,200 miles long, rises in the mountains of Guiana. About 130 miles below its source, it sends off to the southward, a branch called the *Casiquiare* (200 miles in length), which joins the River Negro, a tributary of the Amazon, and thus effects a natural communication, navigable for boats, between the basins of these two great rivers.

254. The principal tributaries of the Orinoco, on its left bank, are the *Guaviare*, *Meta*, and *Apure*, rising in the Andes; on the right bank, the *Ventuari*, *Caura*, and *Caroni*, having their sources in the *Pacaraima* Mountains. Below the village of *Angostura*, 50 miles from the mouth of the Orinoco, no impediments to its navigation occur: above this, its course is occasionally interrupted by rapids; but, in general, it presents a deep and navigable channel nearly to its source.

255. The *Amazon* rises in the Marañon in the upper portion of its course, rises to the small lake of *Chincacocha*, upon the table-land of the Andes. It ascends the highest parts of the Peruvian Andes. The river flows in a northerly course until it leaves the mountains, and then flows toward crosses the great plain in an easterly direction to the Atlantic Ocean. The whole length of the Amazon is 3,900 miles.

The tributaries of the Amazon are numerous and on a grand scale. Some of them bear the names of the largest streams of Europe. The principal tributaries of the Amazon are the *Orinoco*, *Putumayo* or *Yapo*, *Ucayali*, *Huallaga*, *Ucayali*, *Madeira*, *Tapajos*, *Xingu*, &c.

What is said of the tributaries of the Amazon? Upon the right bank? The *Madeira*!



above the level of the sea, and flows in an easterly direction across the plateau of Bavaria, through Austria, the plain of Hungary, and between Bulgaria and Wallachia, to its entrance into the Black Sea.

265. The Danube is navigable from its mouth up to Ulm (10° east longitude), or throughout nearly its entire course; the only interruption being between the towns of Moldova and Gladova, where it passes, for a space of 60 miles, through a succession of rapids and shallows. The principal tributaries are the Inn, the Drave, the Save, and the Morava, on the south; and the March, the Theiss, the Aluta, and the Pruth, on the north. All of these are rivers of considerable magnitude.

266. The more important of the other streams which flow into the Black Sea, are the Dniester which is 500 miles long; the Dnieper which is 1,200 miles in length; and the Don, 1,000 miles. The Dnieper is navigable from Smolensk to the sea, except for a distance of about 150 miles below Kiev, within which distance its navigation is considerably impeded by rocks and cataracts.

267. The *Rhine* rises in the Alps, at an elevation of 6,580 feet, and flows in the upper portion of its course through Lake Constance. It has a length of 760 miles, and its basin is 70,000 square miles in area: at Basle, where it is 765 feet above the level of the sea, its breadth is 800 feet, at Mentz about 1,700, and at Cologne 1,400. It is navigable for boats as high up as the Falls of Schaffhausen, a short distance below Lake Constance; and, for vessels of some magnitude, as high as Strasburg. The current is generally rapid, flowing at the rate of four or five miles an hour. Its principal affluents are the Neckar and Main on the right bank, and the Aar and Moselle on the left.

268. Of the other considerable rivers flowing into the Atlantic Ocean are—the Elbe (690 miles) and the Weser (380 miles) to the north, and the Meuse (550 miles), Seine (430 miles), Loire (570 miles), and Garonne (350 miles), to the south. Spain.

Questions.—265. Navigation of the Danube? Tributaries? 266. Other streams which flow into the Black Sea? The Dnieper? 267. The Rhine? Its length, extent of its basin etc.? Its principal affluents? 268. Other considerable rivers flowing into the Atlantic Ocean? Rivers of Spain?

is and table-lands which extend east and west through

The northern division embraces the rivers which empty into the Arctic Ocean, and those, in the west, which terminate in seas or lakes unconnected with the ocean. The more numerous class includes the streams which have their sources in the mountains of the interior, and flow either into the Indian Ocean, or eastwardly into the Pacific.

The *Obi*, which flows into the Arctic Ocean, is 2,530 miles in length; its river-basin is 1,250,000 square miles in extent, probably the largest basin of any river in the Eastern Hemisphere. The other principal rivers in the north of Asia are the *Yenesei* (2,900 miles) and the *Lena* (2,400 miles). The *Obi*, *Yenesei*, and *Lena* all rise in the mountains of the Siberian system, and flow through the Siberian plain. Owing to the severity of the climate their waters are frozen during a great part of the year, and they are hence of little use for the purposes of navigation.

1. The *Ganges* (1,460 miles) and the *Indus* (1,700 miles), are two of the most important rivers of Asia, both water the northern portion of Hindoostan. The *Ganges*, whose basin extends from east to west to the south of the Himalaya Mountains, flows in an easterly direction into the head of the Bay of Bengal. At its mouth it divides into numerous arms, which inclose a *delta* of immense extent (page 72): its most western arm, called the *Bhojputra*, upon which Calcutta is built, is the only one that is usually navigated. The *Ganges* is remarkable for the great extent of its fall: it is ascended by steamers as high as Allahabad, more than 800 miles from its mouth.

275. The *Indus* rises on the plateau of Tibet, to the northward of the Himalaya Mountains, at an elevation of more than 15,000 feet, and flows into the Arabian Sea. About 470 miles above its mouth, the *Indus* receives, on its left bank, the river *Chenaub*, which collects the waters of the five streams of the *Jeloam*, the *Chenaub*, the *Ravee*, the *Bayas*, and the *Sutlej*. The district watered by these five rivers is called the *Punjaub*.* All the

sections.—273. The *Obi*? Other considerable rivers of northern Asia? What further of the *Obi*, *Yenesei*, and *Lena*? 274. The *Ganges* and *Indus*? Give particulars. 275. The *Indus*. Its tributaries. How far navigable?

* Properly, *Penj-ab*, or five rivers.



The source of the Nile—calling the head -el-Abiad its real source—has not yet been ascertained, but its course has been traced upward to 3° of north latitude, and there is reason to believe that it is south of the equator.

the Nile has so great a length of course—probably of 3,500 miles—its basin is of very limited distance of 1,400 miles above its mouth it rears. Through the middle and lower portion of Nile flows in a narrow valley inclosed on each rocks: the width of this valley varies from one to Nubia and Upper Egypt, to as many as ten or twelve down the stream.

The *Niger* or Quorra is the largest of the African rivers flowing into the Atlantic Ocean. It rises in the mountains of Senegal, where the main tributary is known as the Joliba; it takes a northeasterly course to the neighborhood of Timbuctoo; then a southeasterly course, passing through a wide opening of the Fouta Mountains, and enters the eastern extremity of the Gulf of Guinea by several mouths. The length of the *Niger* is about 2,500 miles. Above the place of its passage through the Fouta Mountains, it receives the waters of the Chadda, a large and deep tributary. The *Niger* has been ascended by a boat to more than two hundred miles above the junction of the Chadda, but the extreme unhealthiness of the climate in the upper part of the river, through which its lower course lies, has contributed to the failure of many attempts made to explore this part of Africa, and to establish commercial relations with the inhabitants.

Besides the Niger, the principal rivers upon the west are the Senegal, the Gambia, the Rio Grande, Volta, the Zaire or Congo, the Coanza, and the . . . Both the Senegal (900 miles) and the Gam- . . . navigable rivers : they flow in a westerly di- . . . their waters from the same mountain ranges in

Length? Basin? Width of the valley in different parts? 281.
direction, and termination? Length? How far ascended by
of the district in which its lower course lies? 282. Other
coasts of Africa? The Senegal and the Gambia? The Gambia
the eastern side? Other rivers?

which are the sources of the Niger. The Gariep, or Orange River, in the southern part of Africa, has a length of upward of 1,000 miles. The principal river upon the eastern side of Africa is the Zambesi, which brings down a great volume of water, and is said to be navigable for boats through a distance of more than 900 miles. The Lufji, Juba, and many other rivers of the eastern coast, have not been explored, and are but little known.

LESSON X.

LAKES.

283. FRESH-WATER lakes occur in the greatest numbers, and upon the largest scale, in the northern regions of the globe. Nearly all the lakes of any considerable extent in North America are situated north of the 40th parallel, while in Europe and Asia, the regions peculiarly characterized by fresh-water collections are, for the most part, north of the 50th parallel. Salt-water lakes have a more numerous, though less very abundant

in eastern Europe, Central Asia, and the North Pole.

284. Lakes are divided, according to certain physical characters, into two classes: those which have fresh water, and those which have salt water. Lake Aral is the largest of the salt-water lakes. It is 1,600 miles long: 1,000 miles wide. It is situated in Asia. In America? In Europe? In Africa? In Asia? Examples.

ings down more than 518,000,000 cubic feet of water hour. The Ural, and many other streams of considerable magnitude, are also received by the Caspian; but its level changed, though it has no perceptible outlet by which to urge the water it receives.

Lake Aral presents the same phenomena, and, though be compared in extent to the Caspian, receives two large the Sihoon and Amoo, or Jihon. The difficulty in explaining the nature of these lakes is to account for the constancy of level, which might be expected to rise considerably, as they daily receiving so large a body of water. The opinion was entertained that they are connected by some internal channel with the sea, and it was supported by the fact that the water of the Caspian and Lake Aral is salt, and contains marine productions; but it has been ascertained that the Caspian is not an 84 feet below the level of the Black Sea, thus completely disproving the hypothesis that they have a connection. It is thought that the phenomena referred to may be accounted for by evaporation and filtration. Besides the Caspian Sea and Aral, there are numerous other bodies of water of this kind, the receptacles of the continental rivers. (See table of Continental Rivers page 74.)

A *third* class comprehends all those lakes which receive waters, but give birth to some. Many of these lakes occupy elevated situations, and are the sources of some of the great rivers. They are no doubt supplied by springs, the waters of which rise in their reservoirs until its level is sufficiently high to admit a discharge. The lake in Monte Rotondo, in Corsica, is one of this class, and is situated 9,000 feet above the level of the sea.

The *fourth* class includes all those lakes which both receive and discharge water, being by far the most numerous. They commonly receive the waters of many rivers, and have one outlet. The origin of such lakes is easily

Aral? Opinion formerly entertained? How supported? How may the constant level be accounted for? Wh
 287. Third class? What is said of many of the lake
 Monte Rotondo? 288. Fourth class? How is the origin



Lake Superior is the largest fresh-water formation on earth, computed to have an area of 40,000 square miles; length, 350 miles; extreme breadth, 165; height above the level of the Atlantic, 623 feet; greatest depth 1,200 feet. There is no doubt to believe, from the appearance of the shores, that the level of this, as well as the other Canadian lakes, formerly occupied a much higher level than they reach at present. The level of water carried off by its outlet, the river of St. Mary, is less than that received by its tributaries, from which circumstance it is inferred that the evaporation from its surface must be very great.

Lake Huron, remarkable for its brilliant transparency, has an area of 25,000 square miles. It is about 240 miles in length, from 180 to 220 in breadth, and is 591 feet above the level of the sea. The outline of this lake is very irregular, and the shores are described as consisting of clay cliffs, rolled stones, rocks, and wooded steepes. The greatest depth of Lake Huron is found to be nowhere more than 450 feet. *Lake Michigan* lies wholly within the United States, is connected with Lake Huron by means of the navigable channel Mackinaw, is about 300 miles long, and has an area of about 25,000 square miles.

Lake Erie has an area of about 11,000 square miles: its level is 565 feet above the sea. This lake is said to be the only one in the whole Canadian chain in which there is any perceptible current, a circumstance which is supposed to be attributed to its comparative shallowness, its average depth being not more than 60 or 80 feet. The current of Lake Erie, which flows in one direction, combined with the great prevalence of westerly winds, and the occurrence of sunken reefs and banks, form serious obstacles to the safe and easy navigation of this lake. The shallowness of the water of Lake Erie causes it to be more readily and more permanently affected by frost, so that its navigation is usually obstructed by some weeks every winter, while that of the other lakes remains open and unimpeded.

291. Give particulars of Lake Superior. Change of level? 292. *Lake Huron*. *Lake Michigan*. 293. *Lake Erie*. What is said of its navigation?

Lake Nevada (111), is about 70 miles in length, from 30 to 35 miles in breadth, and is nearly 4,200 feet above the level of the sea. Its waters are saturated with common salt; and during periods of drought, considerable quantities of this substance are precipitated to the bottom, and there crystalized. No living creature is found to exist in this lake. It receives the waters of the Bear, Weber, and other rivers; but, as is common with the lakes in this region, it has no connection with the ocean.

297. Upon the Mexican plateau is the large lake of *Chapala* (about 650 square miles), which is discharged into the Pacific by the river Santiago. *Lake Nicaragua* (about 3,500 square miles), in Central America, lies at an elevation of about 128 feet above the sea. The distance between its western shore and the coast of the Pacific is only eleven miles; it is drained by the San Juan, which flows into the Caribbean Sea.

298. SOUTH AMERICAN LAKES.—South America has few lakes of any great extent. The largest is *Lake Titicaca* (about 3,800 square miles), situated on a plateau of that name, at an elevation of 12,785 feet, and surrounded by some of the highest summits of the Andes. The water of Lake Titicaca is fresh; a river called the Desaguadero, which leaves its southern extremity, flows into the smaller lake (or marsh) of Aullagas, or Uros, which lies at 490 feet lower level, and the water of which is salt.

299. *Lake Maracaybo* (5,000 square miles), near the coast of Caribbean Sea, is connected by a narrow strait with the Gulf of Maracaybo, and has brackish water. The *Lake dos Patos* and *Lake Mirim* are on the southeast coast of Brazil.

LESSON XII.

LAKES—(continued).

EUROPEAN LAKES.—There are two principal lake-regions in Europe, one lying around the Baltic, and situated with

ve particulars of Lake Chapala. Lake Nicaragua. 298. What
? Lake Titicaca? 299. Lake Maracaybo? Other lakes? 300.
there in Europe, and where are they respectively situated?
division characterized?



of water, occupying the deep hollows within the elevated mountain-valleys. The largest lake in Scotland, and also in Britain, is *Loch Lomond*. Its area is 40 square miles; extreme length, 24 miles; and its greatest width, 7 miles.

303. Of the lakes in Ireland, the largest is *Lough Neagh*. It is situated in the northern part of the island, and has an area of 150 square miles. The three *Lakes of Killarney*, in the south, are noted for their beautiful scenery.

304. ASIATIC LAKES.—The largest fresh-water lake in Asia is *Lake Baikal*, situated among the northern offsets of the Altai mountain-system. It has an area of about 15,000 square miles, and lies at an elevation of 1,793 feet above the level of the sea. Its water is fresh, and abounds in fish. It is annually frozen over for a period of five or six months, and may be traversed on sledges.

305. Among the smaller lakes of Asia are *Balkashi*, *Oubsa*, *Zaisang*, *Issyk*, *Bosteng*, *Lop*, *Koko-nor*, *Bouka-nor*, and *Tengri-nor*—all on or adjacent to the high plateaus in the interior of the continent;—*Tong-ting* and *Poyang*, in China;—*Zurrah* and *Bakhtegan* (both salt), on the plateaus of Afghanistan and Persia;—*Urumiyah*, *Van*, and *Goukcha* (the two former of which are salt), on the Armenian table-land;—the salt lake of *Koch-hissar*, in Asia Minor;—with *Lake Tiberias* and the *Dead Sea*—in Palestine.

306. AFRICAN LAKES.—The largest body of inland water known in Africa is *Lake Tsad*, which lies in the central part of the continent and is several thousand square miles in area. Its waters are very shallow, though fresh and clear. It is not known to have an outlet, but it probably has a channel of discharge like all fresh-water lakes.

307. Of the other African lakes are *Lake Dabbie*, through which the Quorra passes; and *Lake Tzana*, or *Dembea*, in Abyssinia. A large lake, called *Ngami* (or “the Great Water”), has lately been discovered in the southern part of Africa, near the parallel, lying at an elevation 2,800 feet above the sea.

304.—305. Lakes in Ireland? 304. Give particulars of Lake Baikal. 305. Asiatic lakes are mentioned? 306. Give particulars of Lake Tsad. 307. Of Africa.

LESSON VIII.

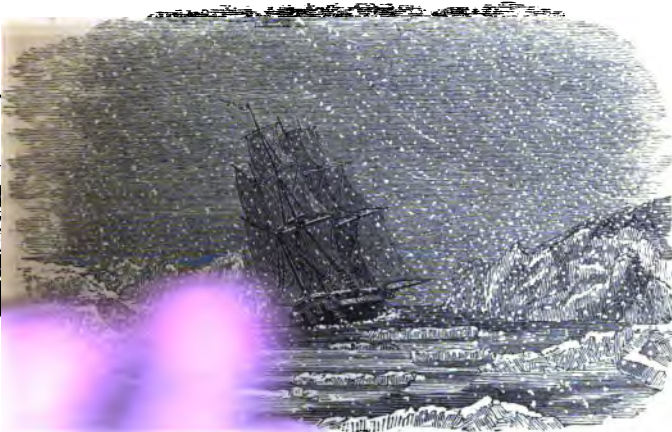
THE OCEAN.

38. The vast body of water which surrounds the land and portions is vast, is comprehended under the general name of the ocean. For convenience it is divided into five portions, named, respectively, the Arctic, Atlantic, Indian, Pacific, and Antarctic oceans. These, with their branches, are as follows:

I.		Branches.
Arctic Ocean.	Extends from the northern shore of America, Europe, Asia, and the arctic circle around the north pole.	Baffin's Bay. White Sea. Gulf of Kara. Gulf of Ost.
II.		
Atlantic Ocean.	Enclosed on the west by America, east by Europe and Africa, north by the arctic, and south by the antarctic circle.	Baltic with its gulf. North Sea. Mediterranean. Black Sea. Hudson's Bay. Gulf of Mexico. Caribbean Sea.
III.		
Pacific Ocean.	Enclosed on the west by America on the north, the South Sea on the south, the antarctic circle on the south, and the North Sea on the north.	Sea of China. Yellow Sea. Sea of Japan. Sea of Okhotsk. Sea of Kamtschatka. Bering's Strait. Sea of California. Gulf of Panama.
IV.		
Indian Ocean.	Enclosed on the north by Africa, on the east by Asia, on the south by the antarctic circle, and on the west by the Atlantic Ocean.	Arabian Sea. Persian Gulf. Bengal Sea.

of water which surrounds the land, and mention the Arctic.

309. The Arctic Ocean has been but partially explored. Various efforts have been made to reach its higher latitudes; but, up to this time, they have proved unsuccessful, in consequence of the impenetrable fields of ice which are met with, and the impossibility of remaining in those regions, with safety, for a great length of time. During the winter months the waters of the Arctic Ocean are covered with ice, which in summer is broken up, and drifted into lower latitudes where it is dissolved.



Arctic Ocean.

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endent
ng of
lakes
20 or
Som
that

Ice in the Arctic waters are of
rags, which have quite an inde-
pendent which is formed by the freez-
ing is generally level like that of
out of the water. Vast fields,
have been found in the Arctic Ocean.
These are so closely packed together
as to seem a solid mass. Smaller sheets are called
drift-ice, much broken up, and the frag-
ments are called *pack-ice* which, when
broken up, is called *drift-ice*. When the parts of a
ship may sail between the

Arctic Ocean? Why have the efforts made?
Of what two kinds are the floating
ice? Floes. Pack-ice. Streams. Drift-



the Atlantic, where they cool the water and air to a great extent around. Icebergs vary from a few yards to miles in length, and are often 1,000 feet high.

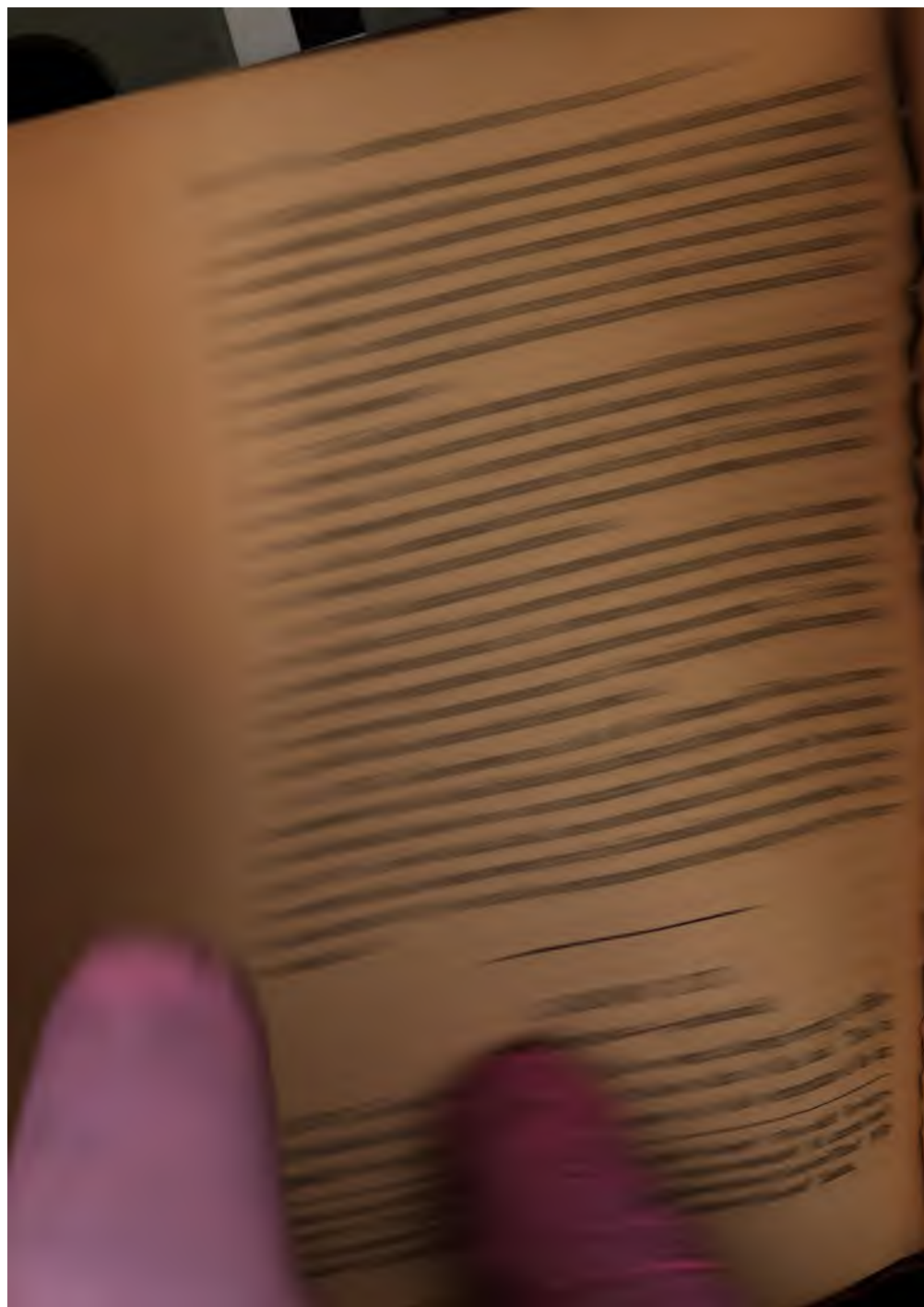
It is supposed that the point of the greatest cold is in the vicinity of Melville Island, and that to the north and west of this is, in summer, a comparatively open sea, or "Polynja." This latter opinion is supported by the fact that beasts and fowls are known to migrate over the ice from the mouth of Mackenzie and its neighboring shores, to the north. In further confirmation of this conjecture, Lieut. De Haven reported that as he entered Wellington Channel the signs of animal life became abundant; and Captain Penny, commander of an English expedition, who penetrated on sledges farther toward the north than it was possible for De Haven to do, reported that he actually lived on the borders of this open sea. ✓

314. The Atlantic, being the principal highway of the world's commerce, is better known than any other of the great divisions of the ocean. It covers an area of about 31,000,000 square miles—nearly one sixth of the surface of the globe. It is upward of 8,000 miles long; and has an average width, between the continents, of something more than 3,000 miles. It is narrowest between Greenland and Norway; its width, there, not exceeding 800 miles. Its greatest width, which is not less than 5,000 miles, occurs between the eastern coast of Mexico and the western coast of northern Africa.

The North Atlantic, generally very deep, is noted for exhalations in the North Sea and southeast of Newfoundland; the immense portion of its surface occupied with seaweed matted together, and forming what is sometimes the "Grassy Sea." A region of this weed extends to the meridian of 40° west, between the parallels of 20° and 30° N., bearing the name of "Banks of Fucus." Thence extending in varying quantities to the Bahamas, covering an area of 1,000,000 geographical miles, or an extent equal to the territory of the United States.

Supposed point of the greatest cold? Open sea or "Polynja"? Conjecture? 314. The Atlantic Ocean? Its extent? 315. The area at noted? Where are the Banks of Fucus situated? What extent of the sea so occupied?

2107 A



the surface of the sea, by day and night, does not appear to be changed three or four degrees. In temperate climates the diurnal range of temperature is rather greater; but it is by no means equal to that on land.

321. From numerous observations of the temperature of the ocean the following facts have been deduced: 1. The temperature of the surface of the ocean is generally lower at mid-day than that of the atmosphere in the shade. 2. It is always higher at midnight. 3. Morning and evening the two temperatures usually correspond. 4. The mean temperature of the surface of the ocean far from land is greater than that of the atmosphere with which it is in contact. 5. The water is colder where it is shallow than where it is of great depth. 6. The seasonal changes in the temperature of the air do not affect the ocean beyond the depth of 300 feet. 7. The greatest heat of the surface, $88^{\circ} 5'$ of Fahrenheit, is found in the Gulf of Mexico, and in one of the rivers of New Guinea.

322. The *color* of the ocean is generally of a deep bluish green, but it varies with every gleam of sunshine or passing cloud, from the deepest indigo to green, and even to a slaty gray. It is different in different localities, depending upon local causes. It is white in the Gulf of Guinea and black around the Maldives. Between China and Japan it is yellowish, and west of the Canaries and Azores it is green. In some parts, as off California, it has a vermilion hue; in others, as the eastern division of the Mediterranean Sea, a purple tint prevails.

These various shades are, in most instances, caused by marine animalcules which pervade the deep; and their present appearance, known as the phosphorescence of the sea, owing to the phosphorescent brilliancy of these tribes. The bed of the ocean, in shallow places, takes a tinge to the superincumbent waters, while the appearance, near the mouths of large rivers, is different, being washed in from the land.

What is said of the temperature of the surface of the ocean at mid-day and evening? Of the mean temperature of the ocean? Of the water? Depths affected by seasonal changes? Where is the greatest heat? 322. Color of the ocean? Mention its hues in different localities. These shades generally caused? What other causes affect its color?



sea, though the vessel from which it is made be per-
st, and though it be known that the plummet has
the bottom, yet the line will continue to run out, and un-
suffered to run out, or the plummet be detached from it,
so great is brought upon it that it invariably breaks. It
adertow, or a system of currents and counter currents
hich, it is supposed, produces this strain.

Most of the vessels of the navy are now furnished with
made especially for deep-sea soundings; and the results
obtained have enabled the officers at the National Ob-
servatory to construct a map of the basin of the North Atlantic
which shows the depressions of the solid parts of the
crust below the sea-level, and which gives us, perhaps, as
an idea of the profile there as geographers have of the con-
afforded by the elevations of the land in the interior of
Asia.

9. The deepest soundings ever reported were made in the
Indian and in the South Atlantic Ocean. Lieut. J. C. Walsh,
commander U. S. schooner Taney, being furnished with a large
quantity of iron wire made expressly for the purpose, obtained,
on the 15th November, 1849, lat. $31^{\circ} 59' N.$, long. $58^{\circ} 43' W.$, a
cast of the plummet, when after 34,200 feet had run out, the wire
parted without reaching bottom, as it was thought. On the 12th
Feb., 1853, Lieut. Berryman, of the Dolphin, in lat. $32^{\circ} 55' N.$,
long. $47^{\circ} 58' W.$, obtained a cast of the lead, using the small
line as a sounding line. At this trial 39,600 feet ran out, when
the line parted, and it was consequently thought that the plum-
met had reached the bottom. On the 5th of April, 1852, lat.
 $30^{\circ} S.$, long. $10^{\circ} W.$, Lieut. Parker, of the U. S. frigate
Albatross, used a cannon ball for his plummet, and sound-
ing officer Berryman's, made an experiment at deep-
sounding. 800 feet of line ran out before it parted.
The time for this sounding was eight hours and

at sounding was made by Capt. Denham

are most of the vessels of the navy provided? Results
of the deepest soundings been made? Give particulars of
Walsh. By Lieut. Berryman. By Lieut. Parker. 330
of these soundings by the light of subsequent experience.

H. M. ship *Herald*, 30th October, 1852, lat. $36^{\circ} 49' S.$, long. $37^{\circ} 06' W.$, with 46,236 feet. He had been furnished with sounding twine from the U. S. frigate *Congress*, and instead of a 32 lb. shot, his sinker was a 9 lb. lead. By the light which subsequent experience has thrown upon the subject of deep-sea soundings, all four of these immense depths have had their accuracy questioned, and it is believed with reason.

331. An instrument has been invented by Passed Midshipman J. M. Brooke, of the U. S. Navy, which enables the officers who now attempt deep-sea soundings to detach the plummet from the line the moment it strikes the bottom, and then to haul up, attached to the line, specimens of the bottom. In this way specimens have been obtained from the depth of 12,000 feet (about 2½ miles). These specimens have been examined with a microscope by Prof. Bailey at West Point, and found to consist entirely of minute sea-shells, not a particle of sand or gravel, or any foreign matter being among them. From this it is inferred that the water at the bottom of the sea is comparatively at rest.

332. The deepest part of the North Atlantic Ocean is probably a little to the south of the Grand Banks of Newfoundland. There is a place there somewhat in the shape of a boot, which none of the officers of the navy have so far been able to fathom. The deepest soundings that have been satisfactorily made show that, in all other parts, the North Atlantic Ocean is not more than 25,000 feet in depth. The soundings which have been made by the navy have established the fact that there is a plateau, at the bottom of the ocean between Newfoundland and the Azores, quite shallow enough for the wires of a submarine and quite deep enough to keep them beyond the reach

How have specimens of the bottom of the ocean been obtained? Of specimens been found to consist of what? Where is the deepest part of the ocean supposed to be? What do the soundings show with respect to the depth of the ocean in all other parts? What important fact has been established by the soundings?

LESSON XV.

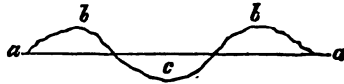
THE OCEAN—(continued).

3. THE ocean is subject to three different kinds of motion : agitated by the action of the wind, producing waves ; by , which result from the attraction of the moon and sun ; and currents, produced under various circumstances, and resulting in a variety of causes.

4. *Waves* are produced by the action of the winds on the surface of the water, and vary in size from mere ripples to enormous billows. Their height in open seas depends upon the force and duration of the wind, and the angle at which it bears down upon the waters ; (but in lakes and bays it is affected by the shallowness of the waters and the character of the shores ; on this account the shallow waters of Lake Erie are more readily agitated by winds than the deeper lakes, Ontario and Huron.

5. Waves are not, as appearances would indicate, an onward flow of water. This is proved from the fact that a floating object merely rises and falls with very little or no progression. Waves agitate the water but a little way below the surface, and it is supposed that the effect of the strongest gales does not extend below the depth of 200 feet.

6. The crest of a wave (*b, b*) is the ridge or highest part, and in strong winds is usually covered with foam ; the trough (*c*) is the depression between waves, and is as much below the general level of the ocean. In estimating the elevation of a wave, the perpendicular height from the trough to the crest is taken.



7. Waves are sometimes said to run mountains high, but this is a popular exaggeration. The highest rise noticed in the Mediterranean is 16 feet, and 20 feet off Australia. During

Questions.—833. What are the three different kinds of motion to which the ocean is subject? 834. How are waves produced, and how do they vary? Upon what does the height depend? How is the height affected in lakes and bays? 835. How do you know that waves are not an onward flow of water? 836. What is the crest of a wave? 837. Give instances to show the height of waves.

1

1. The first part of the document is a list of names and addresses. The names are written in a cursive hand, and the addresses are written in a more formal, printed hand. The list is organized into two columns, with names on the left and addresses on the right. The names are: John Smith, James Brown, William Jones, Robert White, Thomas Green, Charles Black, Henry Grey, George King, Edward Lee, and Benjamin Hall. The addresses are: 123 Main Street, New York, NY; 456 Elm Street, Boston, MA; 789 Oak Street, Philadelphia, PA; 101 Pine Street, Washington, DC; 202 Cedar Street, Baltimore, MD; 303 Birch Street, San Francisco, CA; 404 Spruce Street, Portland, ME; 505 Fir Street, Seattle, WA; 606 Redwood Street, Los Angeles, CA; and 707 Cypress Street, San Diego, CA.

2

the distance between them is less, it follows that the shortest distance will be those of greatest attraction; the waters at *a* will be more powerfully attracted than *e*, and *f*, and the result will be a bulging out at *a*.

But while high water is thus produced at *a*, it also occurs, at the same time, in the opposite hemisphere, at *d*. Different names have been assigned for this phenomenon; but it is probably owing to the attractive influence of the moon. The center, *E*, will be more powerfully drawn toward the moon than the waters at *d*, and recede from them, producing the same effect as though they receded or rose up from the center of the earth.

As the waters can not rise in one place without falling in another, they are depressed at *e* and *f*, when elevated at *a* and *d*.

42. If the earth remained stationary upon its axis, there would be two elevations and depressions of the waters in each month, or the time the moon is making her circuit round the earth. But by the diurnal rotation, the moon passes every day the meridian of every part of the globe, producing two seasons of high and low water.

43. The time of high tide does not coincide with the time when the moon is on the meridian of the place, a period of several hours ordinarily intervening between the time of the moon's transit and that of high water. The explanation of this is, that the water, having received motion, continues to rise after the moon has passed from its meridian, the impulse continuing for some time after the moon's transit.

44. Besides the attraction of the moon, the influence of the sun is concerned in elevating the waters of the ocean. The solar attraction is not as strong as the lunar, because, though a much larger body, the sun is at a far greater distance from the earth. The tidal influence of the sun has been calculated to be but one third that of the moon.

45. Sometimes the sun and moon act in conjunction, as

Notes.—341. Explain how high water will be produced in the hemisphere of the moon. 342. What would happen if the earth remained stationary? What effect would diurnal rotation? 343. What is said of the time of high water? How explain what is said of the influence of the sun on the tides? 344. When do the spring and neap-tides?

the east, while the western coast west; its direction, in the latter of what it was before doubling the

South America, from Rio Janeiro to advances from east to west, bringing it southward, as if the wave came from the coast of South America, the tide in the Strait of Magellan travels from the same side of North America, Panama, northward, to Queen Char-

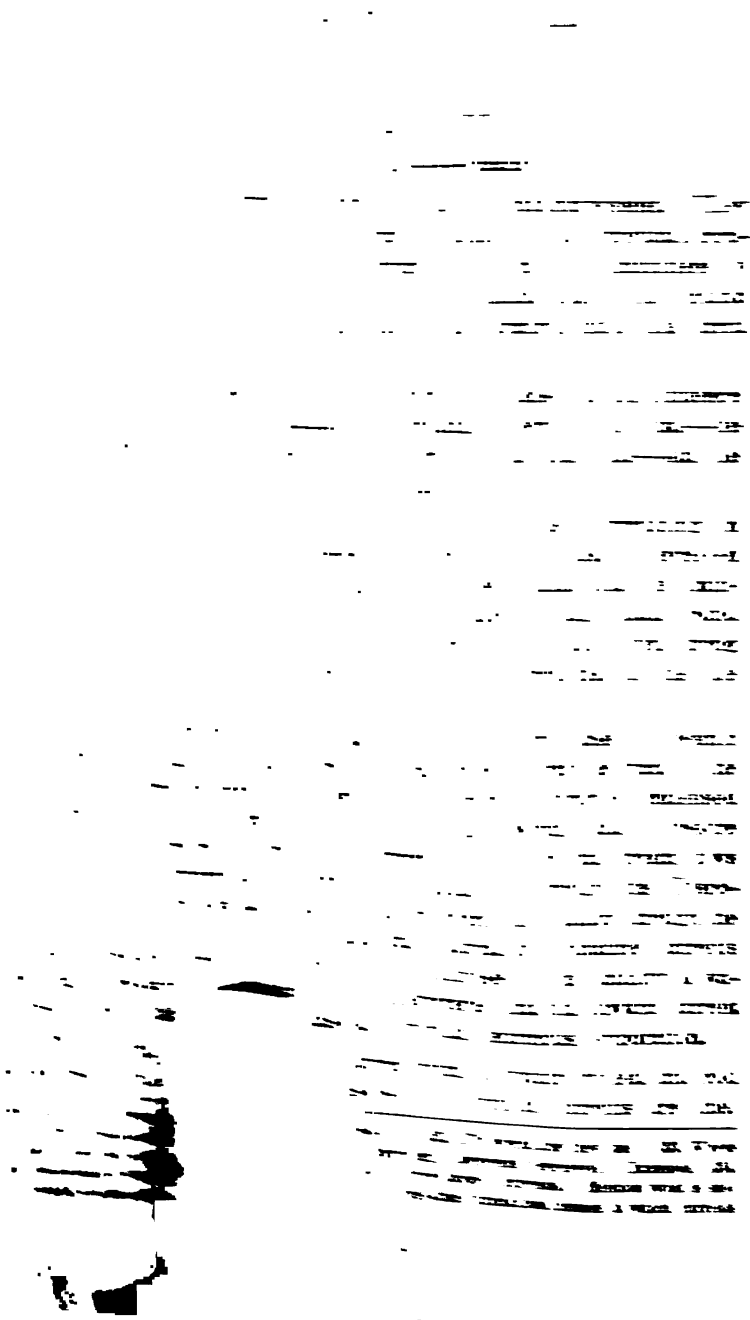
As the tides rise, varies greatly in different places. The rise does not exceed three feet; at the west of France, the spring tides rise 50 feet in the British Channel, 60 feet; and, in the Gulf of Nova Scotia and New Brunswick, it is 100 feet. On some occasions, the rapidity of the rise has been observed to overtake animals feeding on the shores.

TABLE OF THE COAST OF THE UNITED STATES.*

Interval between time of moon's trans- it and time of high water.		Rise and Fall.			Mean Duration.		
Mean.	Dif. betw. greatest and least	Mean.	Spring.	Neap.	Flood.	Ebb.	Stand.
H. M.	H. M.	Feet.	Feet.	Feet.	H. M.	H. M.	H. M.
11 25	0 44	8 8	10 0	7 6	6 14	6 12	0 20
11 22	0 44	10 1	18 1	7 4	6 16	6 18	0 9
7 57	0 41	8 8	4 6	2 8	6 50	5 33	0 42
7 45	0 24	8 9	4 6	3 1	6 21	6 8	0 23
11 16	1 8	5 8	6 6	5 1	6 24	6 5	
8 18	0 46	4 8	5 4	3 4	6 0	6 25	0 23
8 17	0 50	2 5			6 1	6 25	
18 38	0 43	1 8	1 5	0 9	5 54	6 33	
7 19	0 47	4 5	5 5	3 8	6 1	6 26	0 26
8 18	0 51	6 5	7 6	5 5	5 4	7 22	0
9 22	1 12	1 4	2 8	0 7	6 59	5 25	

* This is the direction of the wave south of Rio Janeiro? Describes the western coast of South America. On the western coast of North America the height to which tides rise at different places.

indebted for the above table to the kindness of A. D. Bache, U. S. Coast Survey.



arm water is specifically lighter than cold, and when certain tions become heated, they rise by reason of their buoyancy ve the general surface, and are replaced by surrounding colder l heavier fluid flowing in beside or beneath them.

356. The revolution of the earth about its axis is still another verful cause in producing currents, particularly those of the atorial regions, which have commonly a westerly direction. e winds of tropical climates, which blow continuously, or ing long periods in one direction, also lend their influence in ecting this class of oceanic movements.

357. Oceanic currents are classed as constant, periodical, varia-, counter, and drift currents. *Constant* currents are produced the rotation of the earth, differences of temperature in the ters of the ocean, and other causes not yet fully understood. *riodical* currents are principally due to the action of tides, ough they are doubtless affected somewhat by the land and sea eezes and monsoons. *Variable* currents are occasioned by tides, nds, and the melting of ice in the polar regions. *Counter* curnts are the streams that flow alongside or beneath, and in op-site directions to, other currents. *Drift* currents are the effect permanent and prevailing winds upon the surface of the sea, d a variety of other causes.

358. ARCTIC CURRENT.—The north polar or Arctic Current, er passing round the North Cape of Europe, crosses the upper rt of the Atlantic, running to the southwest till it reaches the st coast of Greenland. It then traverses the narrow sea be- een that country and Iceland, turns round Cape Farewell, the uthern extremity of Greenland, and proceeds northward into avis' Strait. It follows the eastern side of the strait as far to e north as Holsteinborg, in latitude 67° , where it abruptly turns the west, and strikes the opposite shore of Cape Walsingham. rom thence its course is southward to Labrador and the north nk of Newfoundland, where it meets the Gulf Stream.

359. The breadth of the Arctic Current is, in some places,

Questions.—356. What other causes are instrumental in producing currents? 357. By what causes are currents produced? What are constant currents? Periodical currents? Variable currents? Counter currents? Drift currents? 358. What is the course of the north polar or Arctic Current previous to its reaching Cape Farewell? After it turns round Cape Farewell? 359. What is the breadth of this current? Its velocity?



[The text in this block is extremely faint and illegible due to heavy noise and low contrast. It appears to be several paragraphs of a document, but no specific words or structures can be discerned.]

reaches the western shores of South America; a small branch rounds Cape Horn, but the great stream flows along the eastern coast until it arrives off the shores of Peru; it then moves toward the west, and in a belt 3,500 miles broad, moves steadily through the Pacific.

On reaching the Indian Archipelago and Australia, it is divided into numerous smaller streams, and hence the variable character prevailing in the Indian Ocean, which render navigation dangerous. A large volume of water forces its way through the straits of Malacca, and joins the great equatorial current which moves toward the eastern coast of Africa. The greater portion of the stream flows round north of the island of Madagascar, and passes through the channel of Mozambique, after which, being joined by other currents from the east, it doubles Cape Horn and enters the bed of the Atlantic.

1. Proceeding northward along the western shores of Africa, it mingles with the Great Atlantic equatorial current which flows out of the Gulf of Guinea. The Equatorial Current, on reaching Cape St. Roque, the most eastern point of South America, is separated into two branches. One proceeds southward along the coast of South America, and before reaching the mouth of the Rio de La Plata, it is turned toward the east, and under the name of the South Connecting Current, makes the circuit of the South Atlantic Ocean, entering the Indian Ocean 200 miles to the south of Cape of Good Hope.

2. The other and principal branch, known by the name of the Guinea Current, is a direct continuation of the equatorial. It flows from off Cape St. Roque, across the mouth of the Amazon, and skirting the low coast of Guiana, and passing through the Caribbean Sea, it enters the Gulf of Mexico, between the Florida Keys and Cuba and the peninsula of Yucatan.

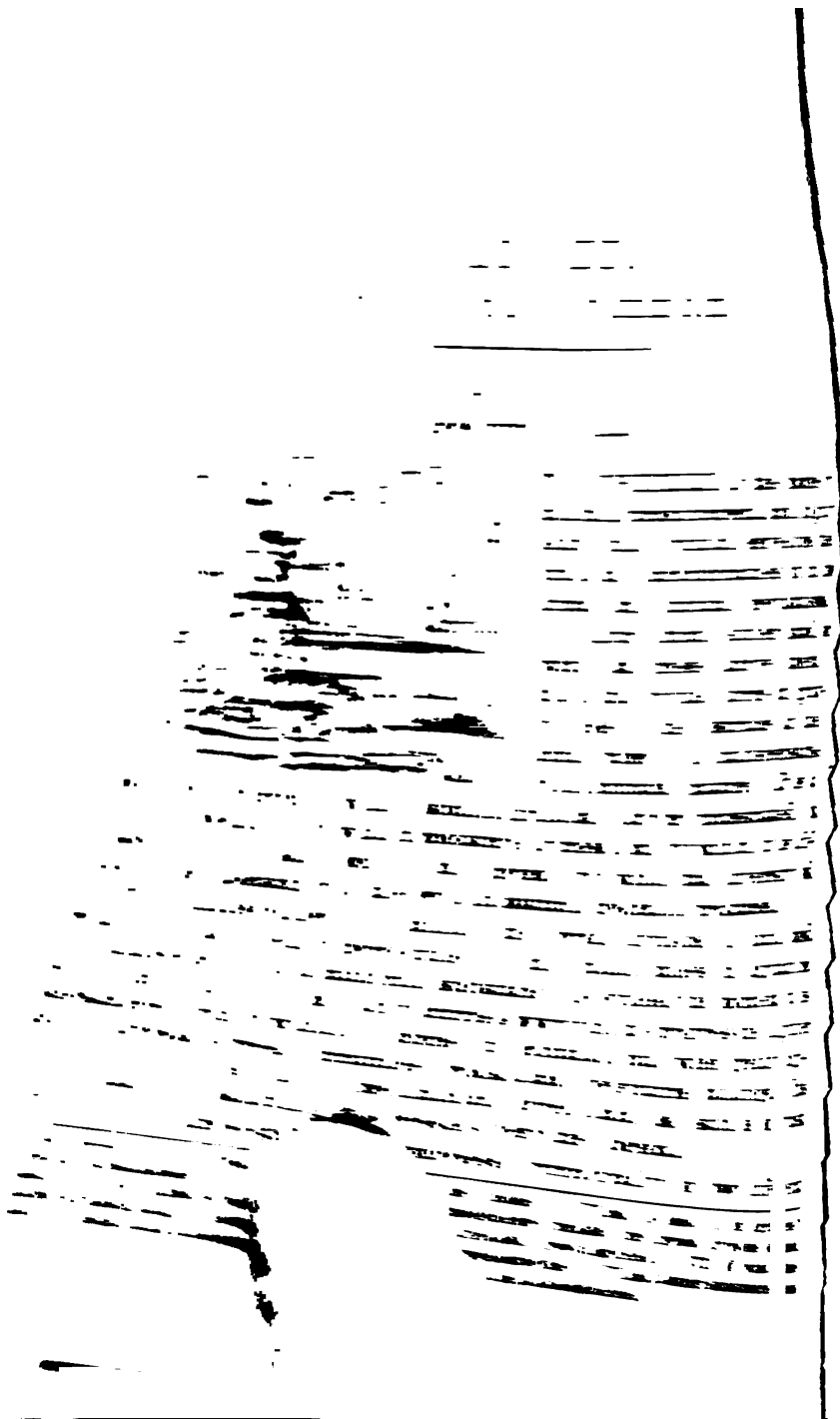
MEXICAN GULF STREAM.—This is the most powerful current, and the most important in consequence of the extent

363. What happens on its reaching the Indian Archipelago and Australia? 364. Its subsequent course until it reaches Cape Horn. 365. Its course through the Indian Ocean. Where is it divided? What is the course of the southern branch? 366. Name of the other branch, and where does it run? 367. What is said of the Gulf Stream? Where does it originate? Its velocity through the straits of Florida? Its course after striking the banks of Newfoundland?

Coming from the heated caldron of the Gulf of Mexico, the waters of the Gulf Stream have a high temperature, which is gradually lost as they reach higher latitudes, "The maximum temperature of the Gulf Stream is 86° , or about 9° above the temperature due the latitude. Increasing its latitude 10° , it loses 2° of temperature. And, after having run 3,000 miles to the north, it still preserves, even in winter, the heat of summer. With this temperature it crosses the 40th degree of latitude, and there, overflowing its *liquid banks*, it spreads out for thousands of square leagues over the cold waters of the ocean and covers the ocean with a mantle of warmth that is so much to mitigate in Europe the rigors of winter. It now moves more slowly, but dispensing its genial influences more freely, it finally meets the British Islands. By these it is divided, one part going into the polar basin of Spitzbergen, the other entering the Bay of Biscay, but each with a warmth considerably above ocean temperature. Such an immense volume of water can not fail to carry with it beyond the seas a warm and moist atmosphere. And this it is which so much softens the climate there."^a

Notes.—303. What is said of its temperature? What is its maximum or greatest temperature, and how many degrees is it above that due the latitude? Describe how the stream serves to moderate the climate of Europe.

^a Lieut. M. F. Maury



ed oxygen and nitrogen, the relative proportions of the former to 79 of the latter. It contains a variable proportion of aqueous vapor, and a still smaller of carbonic acid gas. The proportions of oxygen and are definite, but the amount of aqueous vapor fluctuates. In ordinary circumstances, the composition of 1000 parts of air may be stated as follows :

Oxygen	210.0
Nitrogen	775.0
Aqueous vapor	14.2
Carbonic acid	0.8
	1000.0

The same proportions of oxygen and nitrogen are found in the atmosphere of all countries, and at all elevations, over land and over sea, on the summit of the highest mountains and at the base, at the equator and in high northern and southern latitudes. The quantity of carbonic acid gas is, however, greater at the level of the sea in summer than in winter; greater by night than the day; and rather more abundant on the summit of high mountains than on plains.

3. Oxygen gas is a supporter of combustion, and is required for the support of animal life; while nitrogen, in its unmixed state, is destructive to both. Without oxygen, fires would cease to burn, and all animals would immediately expire. By the process of breathing, it is taken into the lungs and goes to purify the blood. When the blood is brought into the lungs it is of a dark blue color; but it then throws off the hydrogen and carbon, and gives oxygen, which gives it a bright red color.

Ex.—373. What is said of the invariable proportions of oxygen and nitrogen in air? In what localities, and at what times, is the quantity of carbonic acid greatest? What is said of oxygen gas? Of nitrogen gas? What would happen without oxygen? What is the color of the blood when brought into the lungs? What change takes place?

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equally in every direction, and the human body, of the size (supposed to measure 15 square feet), sustains the pressure of 31,360 pounds or 14 tons. We do not feel the pressure, owing to its acting uniformly on all sides, and the air within our bodies perfectly counterpoises the external pressure.

The weight of a column of the entire atmosphere is equal to that of a column of water of the same base about 34 feet or a similar column of mercury 30 inches high. The pressure diminishes as we ascend, according to a scale, which is as follows. From numerous observations it has been ascertained that

at the height of	8½	miles above the level of the sea, the air is	2	times lighter than at the earth's surface.
	7		4	
	10½		8	
	14		16	
	17½		32	
	21		64	
	24½		128	
	28		256	

The pressure of the atmosphere is indicated by the barometer (the measure of weight), an instrument consisting of a tube of mercury poised or pressed up into a vacuum by the weight of the atmosphere. The mercury rises or falls according to the pressure of the atmosphere, its range, at the level of the sea, being from about 28 to 31 inches.

The barometer is used for determining the height of mountains. At the level of the sea, the pressure is greatest in consequence of the weight of all the superincumbent atmosphere, hence at that point the highest column of mercury will be sustained; but as we ascend, this superincumbent pressure is diminished, and consequently the mercury falls. Thus, Humboldt, at the foot of Mount Chimborazo, found the barometer to stand at 30 inches; but, on ascending the mountain to the elevation of 19,000 feet, it was very little higher than 14 inches.

Ques.—877. To what is the weight of a column of atmosphere equal? 878. By what instrument is the pressure of the atmosphere indicated? What is the range of the barometer at the level of the sea? 879. For what is the barometer used? Where is the highest column of mercury sustained, and why? Why does it fall as we ascend? What did Humboldt discover? Lieut. Herndon? What have experiments

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1. The first step in the process is to identify the problem or issue that needs to be addressed. This involves gathering information and understanding the context of the problem.

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attempting to reach a high elevation in the Andes. He experienced the same difficulty in kindling and maintaining a fire at the heights, which Marco Polo felt on the mountains of Asia. In the high regions of the Andes a malady prevailed *veta*, which is thus spoken of by Lieut. Herndon: "It is the sickness caused by the rarity of the atmosphere at great elevations. The Indians call it *veta*, or vein, because they believe it is caused by veins of metal diffusing around the mountainous infection. The affection displays itself in a violent headache, with the veins of the head swollen and turgid, a difficulty of respiration and cold extremities."

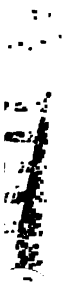
LESSON III.

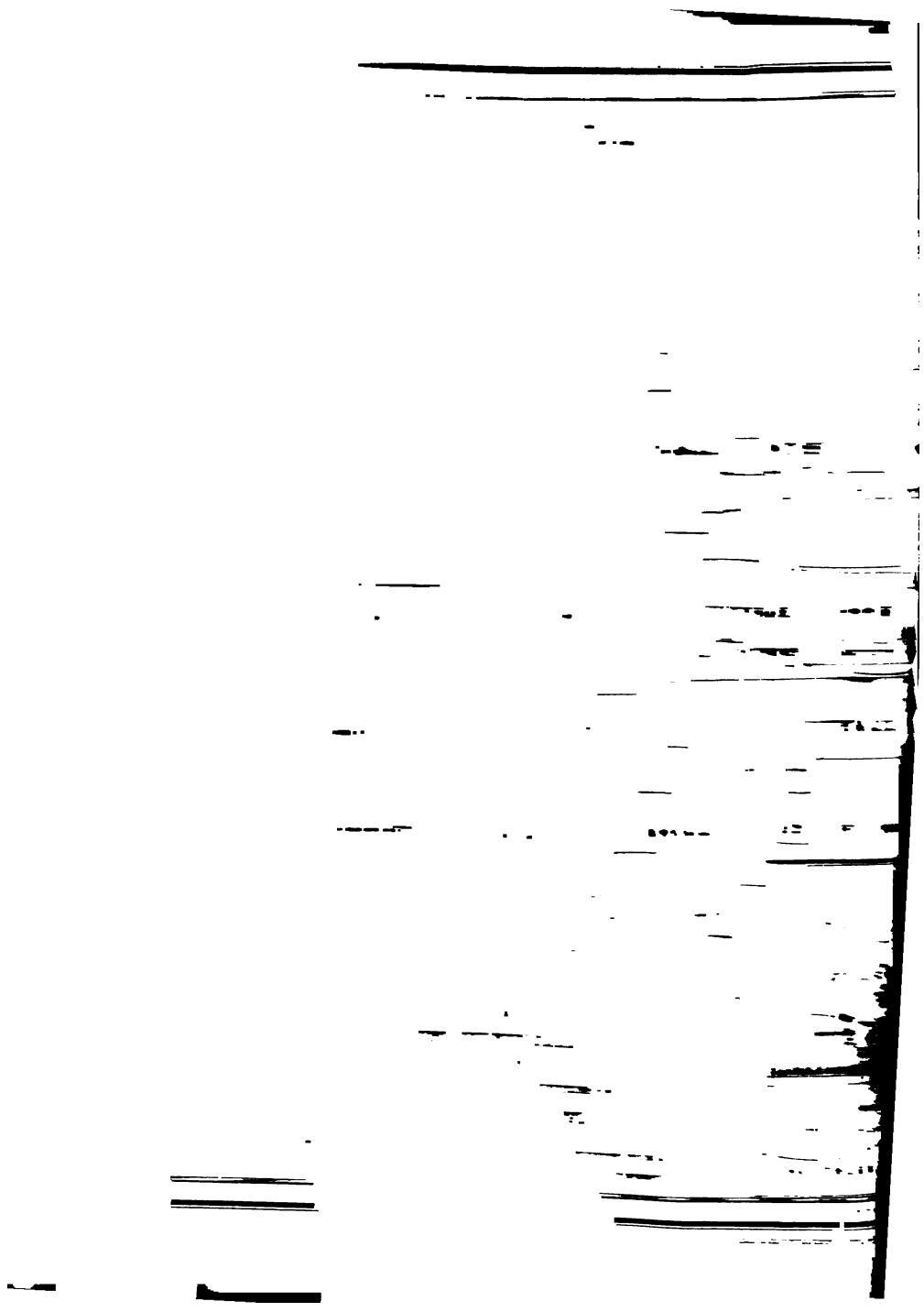
WINDS.

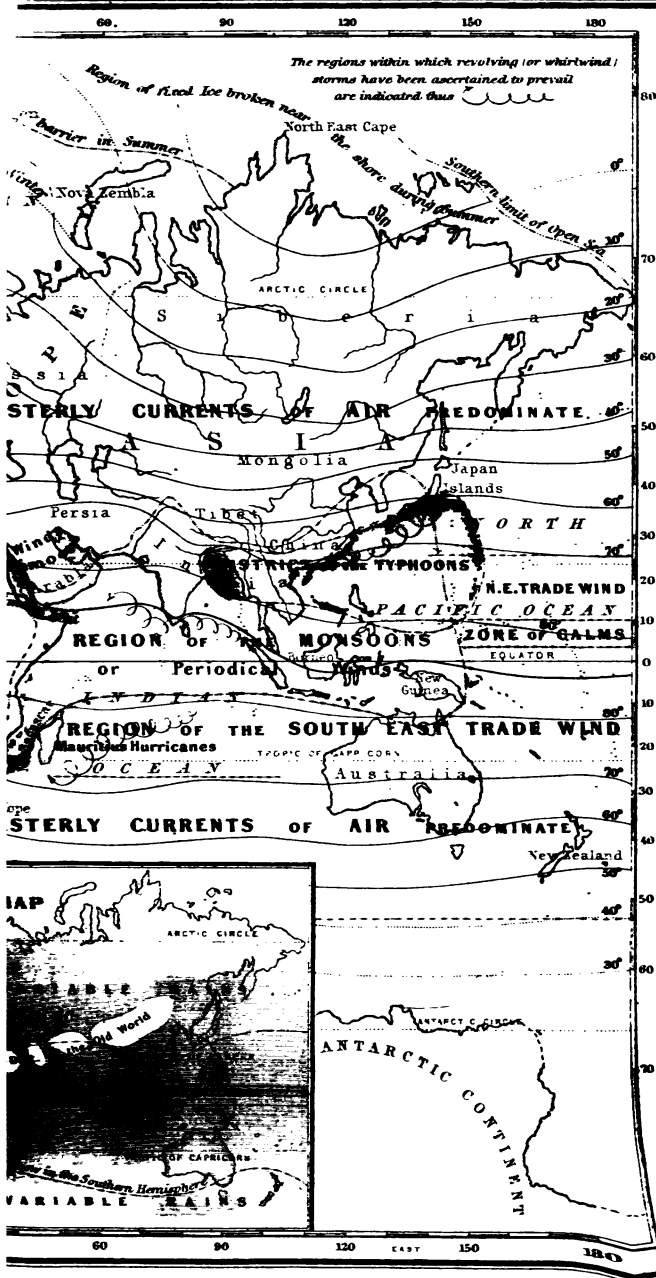
3. THE atmosphere remains at rest as long as its density is unchanged; but, as soon as the equilibrium is broken by any cause whatever, a motion occurs, which is called *wind*. If, in one part of the atmosphere, the air becomes dense, it passes over to those parts where the density is less, in the same manner as air, compressed in a pair of bellows, escapes by the orifice. We may compare this displacement of air to that of water in a river; it is a flowing of the aerial ocean from one region toward another.

34. The currents of the atmosphere perform many invaluable services to man. They renew the air of cities; and they moderate the climates of the north by bringing to them the heat of the south. They transport the clouds from the sea to the interior continents, thus aiding to fertilize regions which would otherwise become arid and uninhabitable. They waft the sails of the merchant-ship around the globe, bring distant nations into familiarity, and are thus greatly instrumental in the diffusion of civilization and Christianity throughout the world.

Questions.—383. How long does the atmosphere remain at rest? What occurs when equilibrium is broken? If in one part of the atmosphere the air becomes dense, what happens? To what may this displacement of the air be compared? 384. Describe the nature of the atmospheric currents.









daily experience teaches us the unequal force of the dominating every conceivable variety, from the almost in-breeze, to the hurricane which prostrates the monarch rest. The following facts respecting the velocity and winds have been ascertained :

Force in pounds	Perpendicular force on one square foot in pounds avoirdupois.	Characteristics.
.....	·005	Hardly perceptible.
.....	·020	Just perceptible.
.....	·123	Gentle, pleasant wind.
.....	·492	Brisk gale.
.....	1·968	Very brisk.
.....	4·429	High wind.
.....	7·873	Very high wind.
.....	12·800	A storm.
.....	17·715	A violent storm.
.....	31·490	A hurricane.
.....	49·200	A violent hurricane.

Winds may be divided into three classes,—Variable, Periodical, and Periodical.

VARIABLE WINDS.—Variable winds, as their name indicate, are very irregular as to time, direction, and force, and continue to blow for many days. They prevail in the temperate and Frigid zones, those of the Torrid zone being, for the most part, either permanent or periodical.

We are not fully acquainted with the causes which produce partial and ever-fluctuating aerial currents, but there is no doubt that they are mainly due to the unequal states of the temperature of land and sea. Although these winds alternately come from every point of the compass, changing frequently from east to the opposite in a very short space of time, it has been observed that different seasons are characterized by winds blowing in different directions. Franklin long ago observed in North America, that in summer the winds come from the south and in winter from the north.

Ques.—888. What is said of the unequal force of the wind? Describe the force, in the characteristic, of wind having a velocity of 1 mile per hour. 2 miles per hour. 10 miles per hour. 20 miles per hour. 30 miles per hour. 40 miles per hour. 50 miles per hour. 60 miles per hour. 80 miles per hour. 100 miles per hour. Into what three classes may winds be divided? 890. What are variable winds? Where do they prevail? 891. To what are they no doubt mainly due? What is observed respecting them? What did Franklin observe?

th of Europe the north winds are of great violence and y, owing to the contrast between the snow-covered Alps and the elevated temperature of the Mediterranean.

The *bora*, a northeast wind, so called in Istria and Dalmatia, is as furious as to overturn horses at plow. The *mistral* and the *bise* are winds which prevail in the southeast of France. The *mistral* blows from the northwest, descending from the mountains of Central France, and sweeping over the ancient provinces of Provence and Languedoc, where it is supposed to contribute greatly to the salubrity of the air, by driving the exhalations from the marshes and stagnant waters common in regions of extensive levels. It is very fearful in the Gulf of Lyons; the name of that gulf, not derived, as commonly imagined, from the city of Lyons, but from the lion-like violence of its tempests. The *vent de black* (black wind) is a cold, piercing current from the Alps and the mountains of Auvergne, which chiefly follows the course of the Rhone, in the valley through which it runs, rendering the climate in winter very severe. In the north wind, called the *gallego*, is of a very formidable character.

7. Hot winds are very frequent in countries contiguous to tropical regions. Large deserts and plains, covered with little vegetation, engender very warm winds; these winds, which are of noxious character, prevail in the vast deserts of Asia and Africa, where they show themselves in all their force. Nubia, Arabia, Persia, and other parts of Asia, are visited by a burning wind peculiar to the desert. In Arabia it is called *samoum*, from the Arabic *samma*, which signifies hot and poisonous. It is also called *samiel*, from *samm*, poison. In Egypt it is called *chamoum* (because it blows for fifty days, from the end of April to June, at the commencement of the inundation of the Nile. In the western part of the Sahara it is named *harmattan*.

8. The Samoum, or Simoom, as more commonly called, is announced by the troubled appearance of the horizon; afterward, the sky becomes obscured, and the sun loses its brilliancy,—paler than the moon, its light no longer projects a shadow; the green of the trees appears of a dirty blue; the birds are restless; and the frightened animals wander in all directions. The rapid evaporation occurring at the surface of the human body, dries the skin

Notes.—296. What is said of the *bora*? The *mistral*? The *vent de bise*? Are these hot winds very frequent? By what name is the burning wind called in Africa? By what other name is it known? What is it called in Egypt, and why? In what part of Sahara? 298. How is the simoom announced? How does it affect the human body?

inflames the throat, accelerates respiration, and causes a violent thirst.

399. This hot wind is deleterious in its mildest forms, occasionally destructive, and many a pilgrim to the shrine of the prophet at Mecca, and merchant to the marts of Bagdad, have perished by its noxious, suffocating influence. Bruce suffered from it when ascending the Nile, he and his company becoming so enervated as to be incapable of pitching their tents, oppressed as well by an intolerable headache. "The poisonous simoom," he remarks, when at Chendi, "blew as if it came from an oven; our eyes were dim, our lips cracked, our knees tottering, our throats perfectly dry; and no relief was found from drinking an immoderate quantity of water.

400. "In June, 1813," says Buckhardt, "in going from Siout to Esné, I was surprised by the simoom in the plain which separates Furschiout from Berdys. When the wind arose I was alone, mounted on my dromedary, and at a distance from every tree and habitation. I endeavored to protect my face by wrapping it in a handkerchief. Meanwhile, the dromedary, into whose eyes the wind drove the sand, became restless, commenced galloping,



and lying on the earth without
a distance of ten metres, and I
the wind had abated, went
and at a very great distance
head against the wind, the

respecting this
Mention soon

Bruce
ed by

Volney gives the following complete account of the simoom and its : "Travelers," he states, "have mentioned these winds under the of poisonous winds; or, more correctly, hot winds of the desert. Such, is their quality; and their heat is sometimes so excessive that it is lt to form an idea of their violence without having experienced it; may be compared to the heat of a large oven at the moment of draw- t the bread. When these winds begin to blow, the atmosphere assumes rming aspect. The sky, at other times so clear in this climate, be- dark and heavy; the sun loses its splendor, and appears of a violet

The air is not cloudy, but gray and thick; and is, in fact, filled with tremely subtle dust that penetrates everywhere.

1. "This wind, always light and rapid, is not at first extremely hot, increases in heat in proportion as it continues. All animated bodies discover it by the change it produces in them. The lungs, which a too ad air no longer expands, are contracted and become painful. Respi- is short and difficult, the skin parched and dry, and the body con- l by an internal heat. In vain is recourse had to large drafts of wa- nothing can restore perspiration. In vain is coolness sought for; all s in which it is usual to find it deceive the hand that touches them. le, iron, water, notwithstanding the sun no longer appears, are hot. streets are deserted, and the dead silence of night reigns everywhere. nhabitants of towns and villages shut themselves up in their houses— those of the deserts in their tents, or in pits they dig in the earth— e they wait the termination of this destructive heat.

3. "It usually lasts three days, but if it exceeds that time it becomes portable. Woe to the traveler whom this wind surprises remote from er! he must suffer all its dreadful consequences, which sometimes are al. The danger is most imminent when it blows in squalls, for then the lity of the wind increases the heat to such a degree as to cause sudden 1. This death is a real suffocation; the lungs, being empty, are con- d; the circulation disordered, and the whole mass of blood, driven by eat toward the head and breast; whence that hemorrhage at the nose mouth which happens after death.

4. "This wind is especially fatal to persons of a plethoric habit, and e in whom fatigue has destroyed the tone of the muscles and vessels. corpee remains a long time warm, swells, turns blue, and is easily sep- ed; all of which are signs of that putrid fermentation which takes e when the humors become stagnant. These accidents are to be avoided topping the nose and mouth with handkerchiefs; an efficacious method d practiced by the camels which bury their noses in the sand, and e ere till the squall is over.

401. What does Volney say respecting these winds? To what do

402. ? What is the aspect of the atmosphere during the continua

403. ? What changes does it produce on all animate bodies? 408. How

409. ? When is the danger most imminent? 404. To whom is the

410.

[The page contains several paragraphs of text that are extremely faint and illegible due to the quality of the scan. The text appears to be organized into sections, possibly separated by headings or subheadings, but the specific content cannot be discerned.]

ded them. Friday and Saturday were uncommonly cool, the mercury being higher than $72\frac{1}{2}^{\circ}$: and although the Sirocco is said to have set in on Sunday morning, the air in our apartments, which are very high, with high ceilings, was not in the least affected by it at eight o'clock, I rose. I opened the door without having any suspicion of such a breeze; and indeed I never was more astonished in my life. The first blast on my face felt like the burning steam from the mouth of an oven. I rubbed my head and shut the door, calling out to Fullarton that the atmosphere was in a flame. However, we ventured to open another door that leads to a cool platform, where we usually walk; this was not exposed to the wind; and here I found the heat much more supportable than I had expected from the first specimen I had of it at the other door. It was somewhat like the subterraneous sweating-stoves at Naples, but still hotter. In a few minutes we found every fiber greatly relaxed, and the doors opened to such a degree, that we expected soon to be thrown into a profuse sweat.

10. "I went to examine the thermometer, and found the air in the room was so little affected that it stood only at 78° . The preceding night it stood at $72\frac{1}{2}^{\circ}$. I took it out to the open air, when it immediately rose to 110° , soon after to 112° ; and I am confident that in our old lodgings, or anywhere within the city, it must have risen several degrees higher. The air was thick and heavy, but the barometer was little affected: it had fallen about a line. The sun did not once appear the whole day, otherwise I am persuaded the heat must have been insupportable; on that side of our room which is exposed to the wind, it was with difficulty we could bear it a few minutes. Here I exposed a little pomatum, which was melted, as if I had laid it before the fire. I attempted to take a walk in the street, to see if any creature was stirring, but I found it too much for me, was glad to get up stairs again. This extraordinary heat continued till five o'clock in the afternoon, when the wind changed at once, almost to the opposite point of the compass. All nature languishes under the influence of this wind; vegetation droops and withers; the Italians suffering from it not less than strangers. When any feeble literary production appears, the strongest phrase of disapprobation they can bestow is, "It was written in the time of the sirocco."

11. The deserts of Asia and Africa are the regions in which the hot or burning winds prevail; but in Spain, the *Salano*, a wind which is supposed to arise on the plains of Andalusia, converts the majority of individuals into a condition of peculiar disorder. In India, which is covered with a rich vegetation, and Chile, in Louisiana, and in the great level plains (*Llanos*) of the Orinoco, there are certain local winds of a very elevated temperature.

Question.—411. What is said of the deserts of Asia and Africa? Of the *Salano*? Where do the very warm winds prevail? Where

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ler atmosphere moves to supply its place. Thus, are created, each hemisphere, two atmospheric currents, an upper and a lower one, each flowing in an opposite direction. If the earth did rotate on its axis, the trade-wind, or lower current in the northern hemisphere, would be from north to south; and, in the southern hemisphere, from south to north. The earth, however, revolves from west to east, and the atmosphere surrounding it takes of this rotary motion; hence, these winds become north-easterly and southeasterly.

114. The following is Lieutenant Maury's theory concerning trade-winds and the laws by which they are governed:

From the parallel of about 30° north and south, nearly to the equator, there are two zones of perpetual winds, viz.: the zone of northeast trades on the north side, and of southeast on that. They blow perpetually, and are as steady and as constant as the currents of the Mississippi River—always flowing in the same direction. As these two currents of air are constantly flowing from the poles toward the equator, we are safe in assuming that the air which they keep in motion must return by some channel to the place where the poles, whence it came in order to supply the trades. If this were so, these winds would soon exhaust the polar regions of atmosphere, and it would stop about the equator, and then cease to blow for the want of air to create a new wind of.

15. "This return current, therefore, must be in the upper regions of atmosphere, at least until it passes over those parallels between which trade-winds are always blowing on the surface. The return current must also move in the direction opposite the direction of that wind which it is intended to supply. These direct and counter-currents are also made to move in a sort of spiral curve, turning to the west as they go from the poles to the equator, and in the opposite direction as they move from the equator toward the poles.

16. "This turning is caused by the rotation of the earth on its axis. The earth, we know, moves from west to east. Now if we imagine a particle of atmosphere at the north pole, where it is at rest, to be put in motion in a straight line toward the equator, we can easily see how this particle of air, coming from the pole, where it did not partake of the diurnal motion of the earth, would, in consequence of its *vis inertiae*, find, as it travels, the earth slipping under it, as it were, and thus it would appear to be coming from the northeast and going toward the southwest: in other words, it would be a northeast wind.

Questions.—414. Where have we two zones of perpetual winds? What are we calling them? Why? 415. Where must this return current be? Which way do the direct and counter-currents turn? 416. How is this turning caused? Explain.

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the north pole to the equator and back again, supposing it, for the instant, to turn back toward the pole after reaching the equator. Setting from the polar regions, this particle of air, for some reason, which does not appear to have been satisfactorily explained by philosophers, travels in the upper regions of the atmosphere, until it gets near the parallel of 80° . It meets, also in the clouds, the hypothetical particle that is going from the equator to take its place toward the pole.

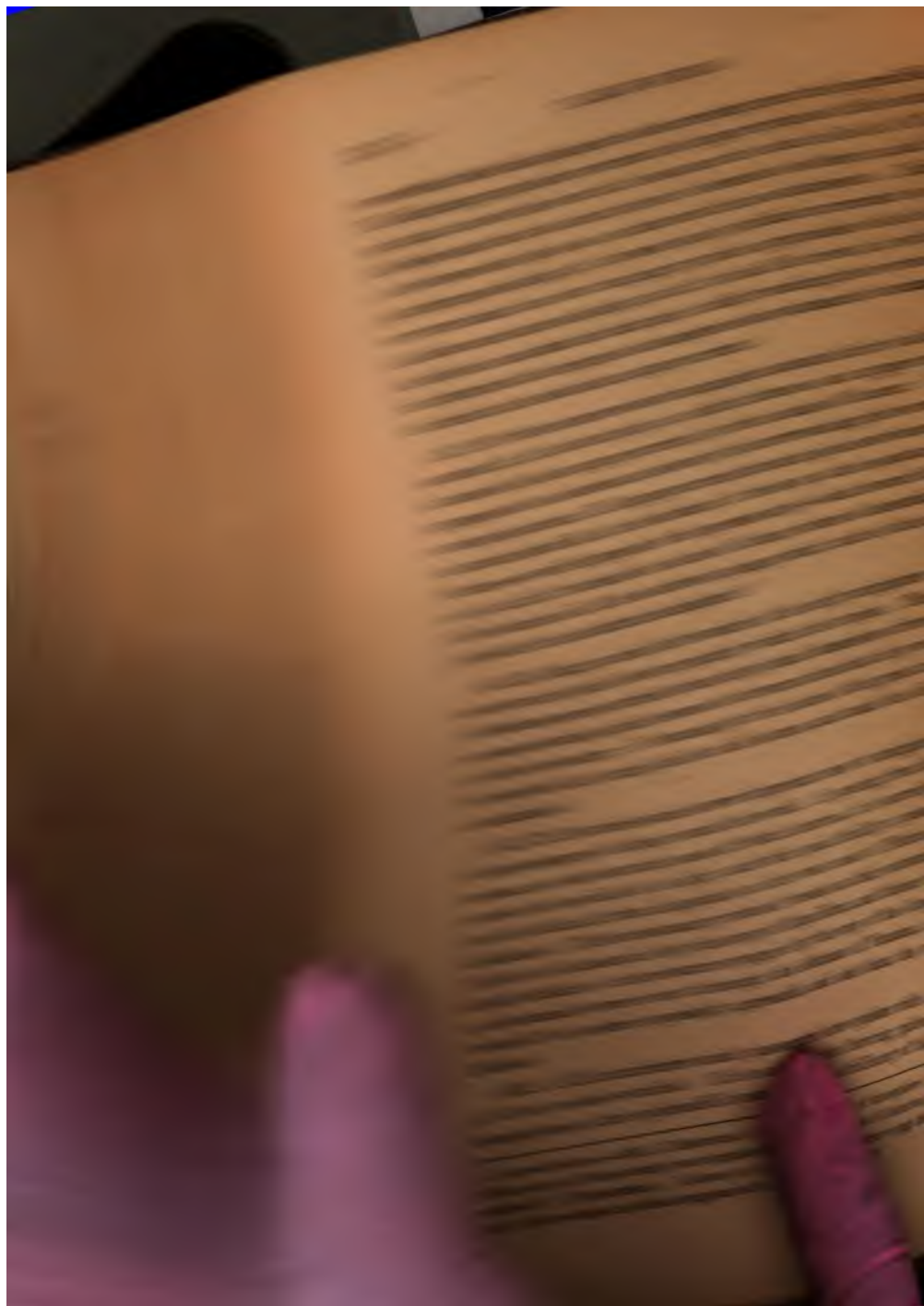
9. "About this parallel of 30° , then, these two particles meet, press against each other with the whole amount of their motive power, produce a calm, and an accumulation of atmosphere sufficient to balance the pressure of the two winds north and south. From under this bank of calms, two opposite currents of wind are ejected: one toward the equator, as the north-trades—the other toward the pole, as the southwest passage winds—supposing that we are now considering what takes place in the northern hemisphere only.

20. "These winds come out at the lower surface of the calm region, and consequently the place of the air borne away in this manner must be supplied, we may infer, by downward currents from the superincumbent air of the calm region. Like the case of a vessel of water which has two streams in opposite directions running in at the top and two of equal capacity discharging in opposite directions at the bottom—the motion of the water in the vessel would be downward: so is the motion of air in this calm zone. The barometer, in this calm region, is said by Humboldt and others to stand higher than it does either to the north or to the south of it; and this is another proof as to the banking up here of the atmosphere and pressure from its downward motion.

21. "Following our imaginary particle of air from the north across this calm belt we now feel it moving on the surface of the earth as the north-trade-wind, and as such it continues till it arrives near the equator, where it meets a like hypothetical particle, which has blown as the south-trade-wind. Here, at this equatorial place of meeting, there is another effect of winds, and another calm region, for a northeast and southeast wind can not blow at the same time in the same place. The two particles have been put in motion by the same power; they meet with equal force, and, therefore, at their place of meeting, are stopped in their course. Here, therefore, there is also a calm belt.

422. "Warmed by the heat of the sun, and pressed on each side by the sole force of the northeast and southeast trades, these two hypothetical particles, taken as the type of the whole, ascend. This operation is the re-

Questions.—419. What results follow? What surface currents are here ejected? 420. From what part of the calm region do these winds come, and what consequently may be inferred? Illustrate the downward motion of the air in this calm zone. What is another proof of the banking up here of the atmosphere and pressure from its downward motion? 421. When does the particle of air move after leaving the calm belt? What occurs at the equatorial place of meeting? 422. Why does it here ascend? Describe its track in return to the pole.



and night. Columbus, in recording his first voyage into their territory, pares the air, soft and refreshing without being cool, to that of the pure balmy April mornings he had experienced in Andalusia. Humboldt, in ribing the tropical regions, remarks upon the mildness of the climate the beauty of the southern sky. He observed stars seen from infancy ressiely sinking and finally disappearing below the horizon, an unwn firmament unfolding its aspect, and scattered nebulae rivaling in ndor the milky way. The Spaniards gave to the zone in which the trade- is are constant the title *el Golfo de las Damas*, the Sea of the Ladies, account of the ease with which it may be navigated, the uniform tem- ture prevalent night and day, and its pacific aspect.

LESSON V.

PERIODICAL WINDS.

427. PERIODICAL winds are those which regularly prevail at certain time of the year or of the day. The monsoons of the lian Ocean, the Etesian winds of the Mediterranean, and the id and sea breezes, are of this class.

428. *Monsoons*, from the Malay word *moussin*, signifying "a ison," are regular periodical winds which sweep over the In- an Ocean and the whole of Hindoostan, changing their direc- n after an interval of about six months, as the sun moves into e northern or southern hemispheres; hence the term *season nds*, or monsoons. These winds are a modification of the de-winds, occasioned by the position of the sun in different asons, the openings in the chain of islands separating the In- an Ocean from the Pacific, the interposition of the Asiatic ninent, and the rarefied atmosphere of Africa and Australia.

429. From 3° south of the equator to the northern shores of e Indian Ocean, including the Arabian Sea, the Bay of Bengal, d the Chinese Sea, a *southwest* wind prevails from April to ctober, and then a *northeast* wind sets in, and prevails through e next half year, from October to April. While the wind north

Questions.—427. What are periodical winds? Name those which belong to this class.
 1. What are monsoons? From what is the term derived? What is said of these winds?
 2. What are the limits of the region having a southwest wind from April to October?
 3. What wind prevails in this region from October to April? Describe the winds which pre-
 4. ll at different seasons between 8° and 10° south of the line.

[illegible]

4 - The lightning streamed down the center of the arch of flame, which appeared to divide the heavens as if every atom of the universe was lit, and the world was in the eye of a universal conflagration. What the heat, which instantly followed, was like the explosion of a powerful magazine. The heavens seemed to be one vast reservoir of flame, which was propelled from its voluminous bed by some irresistible omnipotent agency, and threatened to fling its fiery rain upon every thing around. In some parts, however, of the purple vapor, by which the arch was by this time completely overcast, the lightning was seen only occasionally to glimmer in faint streaks of light, as if struggling long unable to escape from its prison, until, at last, and too weak to burst, the overpowering darkness of that conjunctive imagination in which it was so close engendered and pent up.

400 "X", heavy and contain
these vivid bursts of light
capable through it. The
caused the car to throb;

vin, that scarcely any thing s
ld arrest or resist, was p
lly loud, that it frequ
re momentarily springi

Questions.—400. Wind is the
 least? its northern? its south?

n of monsoons? Its cast
is?

heavens, and I could almost fancy that one of the sublimest fictions then fable was realized at this moment before me, and that I was waging an assault of the Titans. The surf was raised by the wind and rolled in thin billows of foam over the esplanade, which was completely covered with the white, feathery spray. It extended several hundred yards from the beach; fish, upward of three inches long, were found upon the flat roofs of houses in the town during the prevalence of the monsoon, and were blown from the sea by the violence of the gales, or taken up in the air-spouts, which are very prevalent in this tempestuous season.

4. "When these burst, whatever they contain is frequently borne by a sweeping blast to a considerable distance over-land, and deposited in the most uncongenial situations: so that now, during the violence of these tropical storms, fish are found alive on the tops of houses; nor is this any longer a matter of surprise to the established resident in India, who sees every year a repetition of this singular phenomenon. During the extreme violence of the storm, the heat was occasionally almost beyond endurance, particularly after the first day or two, when the wind would at intervals only subside, so that not a breath of air could be felt, and the punka afforded but a partial relief to that distressing sensation which is caused by the oppressive stillness of the air so well known in India."

435. The monsoons are of great assistance to commerce; by means of a ship is frequently wafted to a distant port, and aided in returning by a monsoon blowing in an opposite direction to that which carried her out.

436. The *Etesian** winds are periodical winds which blow from the northeast for about six weeks throughout the Mediterranean, particularly the Levant, where they commence toward the middle of July, about nine in the morning, and continue only throughout the day. The immense desert of Sahara, south of the Mediterranean, deprived of water, and composed of sand and rocks, becomes very highly heated under the influence of an almost vertical sun, and currents are created from the colder atmosphere of the north. Hence the passage from Europe to Africa is much quicker in summer than in autumn. Periodical currents, called *nortes*, or north-winds, blow in the Gulf of Mexico from September till March. They also occur on the Brazil coast, blowing from the N. E. in spring, and from the S. E. in autumn.

437. *Land and sea breezes* are supposed to be caused by the

Questions.—435. Uses of monsoons? 436. What are the Etesian winds? Explain how they are caused. When and where do the *nortes* blow? 437. How are land and sea breezes supposed to be caused? Describe them.

* *Eros*, a year, a season.

4. The fourth part of the document discusses the implications of the findings. It suggests that the results have significant implications for the field of study and may lead to further research in this area.

5. The fifth part of the document concludes the study. It summarizes the key findings and provides a final statement on the importance of the research.

er the ocean—now borne high upon the backs of the waves—now hurled
vn into the depths; so that every seam cracks and groans as though it
uld part asunder. The thunder rolls unceasingly; continuous lightning
ts through the agitated atmosphere; the rain falls in streams instead of
ps. Ten times the sailors give themselves up for lost, when the quaking
k falls into the trough of the sea, and as many times does it rise over
waves again.

441. "At last the storm lulls; single shocks follow, always at longer in-
vals; the waves become smoother, and when the consoling sun rises in
east, it illuminates the same dreary picture as on the former day. Mir-
-like the endless surface again expands, and in eight days is the store of
lected water exhausted; and again the silent specters creep about and
n murderous looks upon each other. A new storm, and a new calm, and
in frightful alternation, until at last the ship is driven into the region of
peaceful trade-wind on the other side of the equator. Hundreds of
ps have gone down in storms here; hundreds lost their crews by the most
ghtful of deaths,—that of thirst; and those who have passed the fearful
gion of calms, turn in earnest worship to Heaven with thanks for their
w-won life."

LESSON VI.

HURRICANES.

442. The terms hurricane, whirlwind, water-spout, land-spout,
nd-pillar, tornado, white squall, pampero, etc., have been ap-
ied to rotary movements of the atmosphere in different parts
the world.

443. *Hurricanes* are revolving storms which occur in the West
dies and in the Indian Ocean. Of a similar kind are the *ty-*
hoons in the Chinese Seas. These gyrating movements oc-
py a space from 50 to 500 miles in diameter. They revolve
e more rapidly the nearer the center, up to a certain distance,
ithin which there is a calm.

444. The center of rotation advances steadily along a definite
e upon the globe, with a velocity varying from 2 to 30 or 40

Questions.—442. What terms have been applied to the rotary movements of the atmos-
ere? 443. What are hurricanes? What space do these circulating movements occupy?
here do they revolve the more rapidly? 444. What is the velocity of the center of rota-
n? What is a remarkable fact? What is the rotation of the storms in the northern
nisphere? In the southern hemisphere?

* Schleiden's "Lecture about the Weather."

1. The first step in the process is to identify the problem or issue that needs to be addressed. This involves gathering information and understanding the context of the problem.

[illegible]

LESSON VII.

WISIRE.

... water in the open air on a warm
... sensibly diminish

the different regions? What is the importance in this region of the Indian Ocean. What is the importance of the Indian Ocean? What is the importance of the Indian Ocean?

vaporated, or converted by the action of heat into invisible and diffused through the air. In like manner, evaporation goes on a grand scale from the oceans, lakes, and rivers, and the moist ground. It is subject to diurnal and annual vari-

449. The quantity of vapor in the air is least just before sun-

Evaporation increases with the rise of atmospheric temperature, or, other things being equal, with the ascent of the sun. Hence, more vapor is generated during the day than during the night; and yet, the greatest degree of dryness in the atmosphere is felt during that portion of the day, when evaporation is going on most rapidly. This is attributable to the influence of solar heat in expanding, and thereby increasing, the capacity of the atmosphere to receive and retain moisture. In January, the quantity of vapor is at its minimum. It increases, from thence, in July, when it attains its maximum; and then decreases to the least of the year.

450. Moisture in the atmosphere is essential to the life of animals and plants. The quantity of vapor in the atmosphere, the direct result of the action of solar heat on water, diminishes as we recede from the equator toward the poles. It also decreases as we pass from the coast regions to the interior of continents. This rule finds confirmation in the comparative dryness of the interior of the United States, the middle of the plains of the Orinoco, the steppes of Siberia, the deserts of Asia and Africa, and the central parts of Australia. In the temperate zones, the average annual evaporation is estimated at from 36 to 40 inches; in the torrid zone, from 97 to 100 inches.

451. The air is capable of receiving a variable quantity of vapor; its capacity depending on its temperature. According to Professor Leslie, air at the freezing point is capable of holding moisture equal to the 160th part of its own weight; at the tem-

Questions.—449. When is the quantity of vapor diffused through the air the least? When does evaporation increase? When does the air feel dryest, and why? In what month is the quantity of vapor at its minimum, and in what at its maximum? 450. What is said of the moisture in the atmosphere? How does the quantity of vapor diminish? How does this rule find confirmation? Annual evaporation in the temperate zone? In the torrid zone? 451. What is said of the capacity of air for receiving vapor? How does it depend? Give its capacity at different states of temperature.

Upon

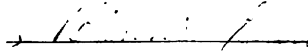
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Dew is formed by the gradual condensation of the vapors atmosphere. In summer, when the heat of the sun has heated the air with aqueous vapor, the earth, becoming, after gradually cooled by radiation under a clear sky, imparts its temperature to those portions of the atmosphere in contact with its surface, and thus diminishes their capacity for moisture. It is, in consequence, gradually and gently deposited in the form of fluid drops, called dew. In some countries, dew supplies the place of rain. In Palestine and other parts of western Asia, showers are unknown for several months in succession, the dew, formed at night, moistens the earth, and sustains the vegetation, being often so abundant as completely to saturate the tents, the clothing, and the clothing of travelers exposed to it.

All substances have not the same capacity for radiating heat, some cooling much more rapidly than others; and, hence, we frequently find certain bodies densely covered with dew, as grass and leaves; while the bare ground, metals, stones, and wood are comparatively dry. A thermometer, laid on a grass plot during a clear, moonless night, has been observed to indicate a temperature lower than another laid, at the same time, on a gravel walk. In the former case, there must have been a much more copious deposition of dew on the grass than on the walk,—the herbs needing the nourishment, thus receiving it in preference to the bare soil—a striking evidence of an all-wise Being operating in the economy of nature.



LESSON VIII.

CLOUDS.

CLOUDS are masses of visible vapor, floating in the atmosphere at different distances from the surface of the earth. They exhibit an endless diversity of outline, density, and color. The clouds are usually formed toward noon, when the vapors are hurried up by the ascending currents of air, and condensed by the lower temperature of the upper regions.

*Ques.—*457. How is dew formed? Explain particularly the operation of its formation. What is said of the dews of Palestine and western Africa? 458. Why does dew collect on some bodies than on others? 459. What are clouds? What is said of them?

12715

and these composed of very fine particles
which during periods of severe cold
are composed of minute
and resemble minute dust
particles. Supposing this appearance we
in the atmosphere, we must have
of the walls of aqueous vapor, in the



461. Notwithstanding the varied aspect of clouds, they may be arranged in three principal classes—the *cirrus*, the *cumulus*, and the *stratus*.

462. *Cirrus*—*Curlcloud*. Fig. 1.—The *cirrus* (the *cat's-tail* of sailors) is composed of thin filaments, variously disposed, in the form of woolly hair, a crest of feathers, or slender net-work. The *cirri* appear in the higher regions of the atmosphere, and are the most elevated of the clouds. Viewed from the summits of high mountains, while the traveler looks down upon other forms of clouds, he beholds these still above him, and apparently at as great a distance as when seen from the plains. The appearance of the true *cirrus*, or *curlcloud*, is supposed to indicate variable weather; when most conspicuous and abundant, to pre-
 sage high winds and rain; and when the streaming fibers have pointed in a particular direction for any length of time, the gale may be expected to blow from that quarter.

463. *Cumulus*—*Stackencloud*. Fig. 3.—This form of cloud (*ball of cotton* of sailors) occurs in the lower regions of the atmosphere, and is easily recognized. It is commonly under the control of the surface winds, and frequently exhibits a very magnificent appearance. It consists of a vast hemispherical or conical heap of vapor rising gradually from an irregular horizontal base and increasing upward. Hence the names, *cumulus*, a pile or heap, and *stackencloud*, a number of detached clouds stacked into one large and elevated pile.

464. *Cumuli* are indications of fine weather. They begin to form soon after sunrise from irregular and scattered specks of cloud; as the morning advances the clouds enlarge; and early in the afternoon, when the temperature of the day is at its maximum, the *cumulus* attains its greatest magnitude. The cloud decreases as the sun declines, and is usually broken up toward sunset. The *cumulus* may be called the cloud of day, from the interval between morning and evening generally measuring the term of its existence. Its appearance considerably varies in the detail, and occasionally exhibits a brilliant silvery light, and a copper

Questions.—461. Of what three principal classes may clouds be arranged? 462. Describe the *cirrus* or *curlcloud*. What is said of the height of the *cirri*? What is the *cirrus* supposed to indicate? 463. Describe the *cumulus* or *stackencloud*. Of what does it consist? 464. What do *cumuli* indicate? Describe their successive changes during the day.

[illegible]

1. ADMINISTRATIVE - GENERAL - PERSONNEL - TRAINING - RESEARCH - PLANNING - OPERATIONS - SECURITY - INTELLIGENCE - COMMUNICATIONS - LOGISTICS - FINANCE - LEGAL - CONSTRUCTION - MAINTENANCE - REPAIRS - UTILITIES - TRANSPORTATION - TRAVEL - FOOD - BEVERAGES - ENTERTAINMENT - SPORTS - RECREATION - RELIGION - CHARITY - EDUCATION - HEALTH - WELFARE - ENVIRONMENT - CLIMATE - WEATHER - DISASTERS - EMERGENCIES - CRIMES - ACCIDENTS - DEATHS - BURIALS - CEMETERIES - MONUMENTS - MEMORIALS - STATUES - SCULPTURES - PAINTINGS - SCULPTURES - PHOTOGRAPHS - VIDEOS - RECORDS - LIBRARIES - ARCHIVES - MUSEUMS - GALLERIES - THEATERS - CONCERTS - OPERAS - BALLET - DANCE - MUSIC - ARTS - SCIENCE - TECHNOLOGY - INVENTIONS - DISCOVERIES - RESEARCH - DEVELOPMENT - INDUSTRY - COMMERCE - TRADE - MARKETING - SALES - DISTRIBUTION - LOGISTICS - FINANCE - BANKING - INSURANCE - REAL ESTATE - CONSTRUCTION - MANUFACTURING - MINING - AGRICULTURE - FISHERY - FORESTRY - ENVIRONMENT - CLIMATE - WEATHER - DISASTERS - EMERGENCIES - CRIMES - ACCIDENTS - DEATHS - BURIALS - CEMETERIES - MONUMENTS - MEMORIALS - STATUES - SCULPTURES - PAINTINGS - SCULPTURES - PHOTOGRAPHS - VIDEOS - RECORDS - LIBRARIES - ARCHIVES - MUSEUMS - GALLERIES - THEATERS - CONCERTS - OPERAS - BALLET - DANCE - MUSIC - ARTS - SCIENCE - TECHNOLOGY - INVENTIONS - DISCOVERIES - RESEARCH - DEVELOPMENT - INDUSTRY - COMMERCE - TRADE - MARKETING - SALES - DISTRIBUTION - LOGISTICS - FINANCE - BANKING - INSURANCE - REAL ESTATE - CONSTRUCTION - MANUFACTURING - MINING - AGRICULTURE - FISHERY - FORESTRY - ENVIRONMENT - CLIMATE - WEATHER - DISASTERS - EMERGENCIES - CRIMES - ACCIDENTS - DEATHS - BURIALS - CEMETERIES - MONUMENTS - MEMORIALS - STATUES - SCULPTURES - PAINTINGS - SCULPTURES - PHOTOGRAPHS - VIDEOS - RECORDS - LIBRARIES - ARCHIVES - MUSEUMS - GALLERIES - THEATERS - CONCERTS - OPERAS - BALLET - DANCE - MUSIC - ARTS - SCIENCE - TECHNOLOGY - INVENTIONS - DISCOVERIES - RESEARCH - DEVELOPMENT - INDUSTRY - COMMERCE - TRADE - MARKETING - SALES - DISTRIBUTION - LOGISTICS - FINANCE - BANKING - INSURANCE - REAL ESTATE - CONSTRUCTION - MANUFACTURING - MINING - AGRICULTURE - FISHERY - FORESTRY - ENVIRONMENT - CLIMATE - WEATHER - DISASTERS - EMERGENCIES - CRIMES - ACCIDENTS - DEATHS - BURIALS - CEMETERIES - MONUMENTS - MEMORIALS - STATUES - SCULPTURES - PAINTINGS - SCULPTURES - PHOTOGRAPHS - VIDEOS - RECORDS - LIBRARIES - ARCHIVES - MUSEUMS - GALLERIES - THEATERS - CONCERTS - OPERAS - BALLET - DANCE - MUSIC - ARTS - SCIENCE - TECHNOLOGY - INVENTIONS - DISCOVERIES - RESEARCH - DEVELOPMENT - INDUSTRY - COMMERCE - TRADE - MARKETING - SALES - DISTRIBUTION - LOGISTICS - FINANCE - BANKING - INSURANCE - REAL ESTATE - CONSTRUCTION - MANUFACTURING - MINING - AGRICULTURE - FISHERY - FORESTRY - ENVIRONMENT - CLIMATE - WEATHER - DISASTERS - EMERGENCIES - CRIMES - ACCIDENTS - DEATHS - BURIALS - CEMETERIES - MONUMENTS - MEMORIALS - STATUES - SCULPTURES - PAINTINGS - SCULPTURES - PHOTOGRAPHS - VIDEOS - RECORDS - LIBRARIES - ARCHIVES - MUSEUMS - GALLERIES - THEATERS - CONCERTS - OPERAS - BALLET - DANCE - MUSIC - ARTS - SCIENCE - TECHNOLOGY - INVENTIONS - DISCOVERIES - RESEARCH - DEVELOPMENT - INDUSTRY - COMMERCE - TRADE - MARKETING - SALES - DISTRIBUTION - LOGISTICS - FINANCE - BANKING - INSURANCE - REAL ESTATE - CONSTRUCTION - MANUFACTURING - MINING - AGRICULTURE - FISHERY - FORESTRY - ENVIRONMENT - CLIMATE - WEATHER - DISASTERS - EMERGENCIES - CRIMES - ACCIDENTS - DEATHS - BURIALS - CEMETERIES - MONUMENTS - MEMORIALS - STATUES - SCULPTURES - PAINTINGS - SCULPTURES - PHOTOGRAPHS - VIDEOS - RECORDS - LIBRARIES - ARCHIVES - MUSEUMS - GALLERIES - THEATERS - CONCERTS - OPERAS - BALLET - DANCE - MUSIC - ARTS - SCIENCE - TECHNOLOGY - INVENTIONS - DISCOVERIES - RESEARCH - DEVELOPMENT - INDUSTRY - COMMERCE - TRADE - MARKETING - SALES - DISTRIBUTION - LOGISTICS - FINANCE - BANKING - INSURANCE - REAL ESTATE - CONSTRUCTION - MANUFACTURING - MINING - AGRICULTURE - FISHERY - FORESTRY - ENVIRONMENT - CLIMATE - WEATHER - DISASTERS - EMERGENCIES - CRIMES - ACCIDENTS - DEATHS - BURIALS - CEMETERIES - MONUMENTS - MEMORIALS - STATUES - SCULPTURES - PAINTINGS - SCULPTURES - PHOTOGRAPHS - VIDEOS - RECORDS - LIBRARIES - ARCHIVES - MUSEUMS - GALLERIES - THEATERS - CONCERTS - OPERAS - BALLET - DANCE - MUSIC - ARTS - SCIENCE - TECHNOLOGY - INVENTIONS - DISCOVERIES - RESEARCH - DEVELOPMENT - INDUSTRY - COMMERCE - TRADE - MARKETING - SALES - DISTRIBUTION - LOGISTICS - FINANCE - BANKING - INSURANCE - REAL ESTATE - CONSTRUCTION - MANUFACTURING - MINING - AGRICULTURE - FISHERY - FORESTRY - ENVIRONMENT - CLIMATE - WEATHER - DISASTERS - EMERGENCIES - CRIMES - ACCIDENTS - DEATHS - BURIALS - CEMETERIES - MONUMENTS - MEMORIALS - STATUES - SCULPTURES - PAINTINGS - SCULPTURES - PHOTOGRAPHS - VIDEOS - RECORDS

4th. Scum—Laurel. It is an evergreen tree, about 100 feet high, with a trunk 12 inches in diameter. The bark is smooth and grey. The leaves are dark green, glossy, and pointed. The fruit is a small, round, black berry, which is eaten by the natives. The wood is hard and heavy, and is used for building canoes and other small boats. The bark is used for making a kind of paper, which is used for writing and for making bags. The leaves are used for making a kind of thatch, which is used for covering houses. The fruit is used for making a kind of wine, which is used for drinking. The wood is used for making a kind of charcoal, which is used for cooking. The bark is used for making a kind of glue, which is used for sticking things together. The leaves are used for making a kind of oil, which is used for lighting lamps. The fruit is used for making a kind of oil, which is used for cooking. The wood is used for making a kind of charcoal, which is used for cooking. The bark is used for making a kind of glue, which is used for sticking things together. The leaves are used for making a kind of oil, which is used for lighting lamps. The fruit is used for making a kind of oil, which is used for cooking.

clouds are generally higher with the tropical
monsoon winds; and in the temperate zones in
summer than in winter. The clouds
are supposed to range from 10,000 to 20,000
feet high. Kaemtz states that during
the night of the Finsterzation
no clouds were observed any where below
the level of the clouds. It is probable that they can

... it should consist? What
... I describe the cir-
... 27. Change to
... a return in different

M. L. B.

LESSON IX.

RAIN.

RAIN is water, which, originally taken up into the atmosphere in the state of vapor, is returned to the earth in the form of liquid drops. It is produced by the continued condensation of vapor. Rain may begin to fall, and yet not reach the ground, being resolved into invisible vapor on arriving at a point of air removed from the point of saturation. For the same reason, rain-drops may become smaller in their descent, a portion being evaporated, and less rain arrive at the earth's surface at a certain height above it. Usually the drops increase in size in fall, bringing with them the low temperature of the upper atmosphere.

The following are examples of very extraordinary showers :

...Oct. 25, at Genoa, 30 inches of rain fell in 24 hours.

...May 27, at Geneva, there fell 6 inches of rain in 3 hours.

...June 4, at Cuiseaux, a small town in the valley of the Saone, there fell about 11 inches in 68 hours.

Cayenne, Admiral Roussin collected 10 inches in 10 hours.

1. Rain is very unequally distributed over the regions of the globe. 1. The average annual quantity of rain is the greatest in the tropical climates, and diminishes as we recede from the equator to the poles. 2. It decreases as we pass from maritime countries to inland countries, because the land supplies a less quantity of vapor than the sea. 3. More rain falls in mountainous than in level districts, lofty heights arresting the clouds, and promoting the condensation of vapor by their cold summits. 4. The result of experiment shows that a greater amount of rain falls while the sun is below than when above the horizon.

The diminution of the average annual quantity of rain from the equator to the poles, appears from the following Table :

San Luis de Maranhao	lat. 3° S.	is equal to 276 inches.
Marimaribo, Guiana.....	" 6° N.	" 229 "

Ques.—469. What is rain? How produced? 470. Give examples of very extraordinary showers. 471. What is said of the unequal distribution of rain? Where is the annual quantity the greatest? Where does it decrease? What is observed of mountainous districts? What does the result of experiment show? 472. What is the annual quantity of rain in different places? The annual quantity within the Tropics of the Old World? Of the New World? Average for the Tropics generally? Annual quantity of the Temperate Zones of the New World? In the Temperate Zones of the Old World? Average for the Temperate Zone generally?



to this rule. The annual number of rainy days decreases as the distance from the sea.

of France	152 days.
of France	147 "
lands of the Volga	90 "
of Siberia	60 "

ual fall of rain in mountainous districts, as compared with level countries, is sometimes very striking. At Keswick—district in England—the annual average depth of rain is 67 inches, and at Paris only 21. "The description of Judea by the sacred writer, contrasting it with the flat lands of Egypt, though it is philosophic, is in harmony with the teachings of science on the important part performed by mountains in the general economy of the world:—'For the land whither thou goest in to possess it, is not Egypt, from whence ye came out; but the land whither ye go now, is a land of hills and valleys, and drinketh water of the rain by arresting the course of the clouds, and producing a consecutive aqueous vapor when a warm current of air lights upon their elevations, the elevations contribute to precipitate the moisture of the clouds, often amid a terrible display of electric phenomena—a blaze of lightnings, and the echo of heart-thrilling sounds.'"

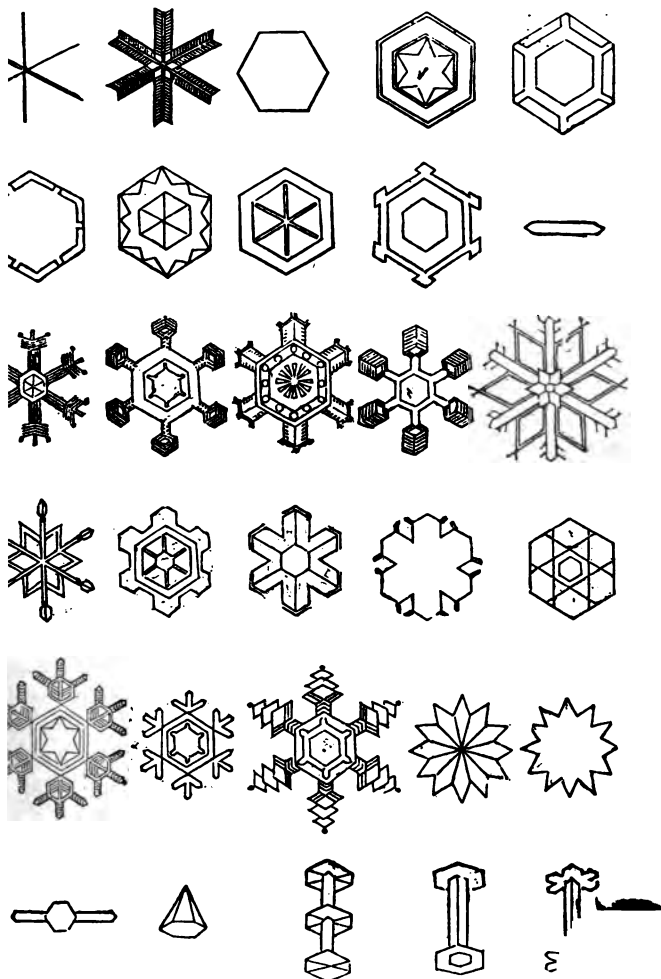
In some portions of the world rain is entirely unknown, and is so seldom as to be quite a phenomenon. The rainless portions of the New World comprise portions of California and Arizona, the Mexican table-land, and the coast line of Peru. The rainless portions of the Old World comprehend an immense territory, extending from Marocco, through the Sahara, a part of Egypt, Syria, and Persia, into Beloochistan, with another great zone, extending north of the Hindoo-Koosh and Himalayas, including the table-land of Tibet, the desert of Gobi, and a portion of Mongolia.

7. The rains of most tropical countries are periodical,—seasons of extreme humidity regularly alternating with those of excessive drought. The length of time of the rainy season varies in different districts, but lasts generally from three to five months.

Notes.—475. What facts illustrate the difference between mountainous districts and level countries, with respect to the fall of rain? What is remarked of the desert of Judea by the sacred writer? 476. What do the rainless regions of the New World comprise? What, those of the Old World? 477. What is said of the rains of most tropical countries? Length of the rainy seasons? When do they commence at Panama? Violence of these tropical showers?



s of lamellar,* spicular,† and pyramidal crystals, as shown annexed representation. It will be seen that the annexed are mostly hexagonal‡ stars, and consequently snow-flakes



Various Forms of Snow Crystals.

LAMELLAR, composed of thin plates or scales. † SPICULAR, resembling
‡ HEXAGONAL, having six sides and angles.

months. The periodical rice culture is found westward of America, in the valley of the Amazon, west the equator, and on the banks of the Orinoco. In the countries watered by the Amazon, in California, they begin in June. The value of rice may be inferred from the large amount of time the fall being limited to a few hours during the day. The crops are harvested, and all with such rapidity as to give it their value against the skin.

127. In both countries the rice is sown in an artificial manner. The seeds are sown in a small space, between the rows of the rice, and the water is raised to a depth of six inches. The water is raised to a depth of six inches, and the rice is sown in a small space, between the rows of the rice, and the water is raised to a depth of six inches. The water is raised to a depth of six inches, and the rice is sown in a small space, between the rows of the rice, and the water is raised to a depth of six inches.

nellar,* spicular,† and pyramidal in depth. Mr. Dar-
d representation. It will be seen that these enormous
sly hexagonal‡ stars, and suddenly formed, and
union of a great num-



Snow Storm.

LESSON XI.

CLIMATE.

its relation to animal and vegetable exist-
most interesting and important sub-
graphy. The term, as it is com-
temperature of the air in the va-
taken in its more general sense,
changes of the atmosphere which
temperature, humidity, variation of
ity of the atmosphere, or its admix-
terious exhalations, and lastly
ncy of the air and serenity
influence on the feelings and
man.

What does the term climate comm-
what does it signify?

486. Climate is determined by a variety of causes, the chief of which are: 1. The latitude of a country; that is, its geographical position with reference to the equator. 2. Elevation of the land above the sea-level. 3. The proximity to, or remoteness of a country from, the sea. 4. The slope of a country, or the aspect it presents to the sun's course. 5. The position and direction of mountain chains. 6. The nature of the soil. 7. The degree of cultivation and improvement at which the country has arrived. 8. The prevalent winds. 9. The annual quantity of rain that falls in a country.

487. (1) *The latitude of a country*, and the consequent direction in which the solar rays fall upon its surface, are the principal causes of the temperature to which it is subject. At the equator, and within the tropics, the greatest heat is experienced, because the sun is always vertical to some place within those limits, and the solar action is more intense in proportion as the rays are perpendicular to the earth. As we recede from the equator, they fall more obliquely; and because fewer of them are spread over a larger space, they are less powerful, and consequently less influential in promoting temperature. It has been calculated that, out of 10,000 rays falling upon the earth's atmosphere, 8,123 arrive at a given point if they come perpendicularly; 7,024, if the angle of direction is 50° ; 2,821, if it is 70° ; and only 5 if the direction is horizontal.

488. The latitude of a place is therefore of the first importance in determining its temperature; since, at the same level above the sea, a decrease of heat accompanies an increase of latitude. This is true of countries lying between the tropics and the poles, but it is not true of places situated between the tropics and the equator.

489. "If the ecliptic, as shown on a terrestrial globe, be examined, it will be seen that toward the northern and southern limits, for a considerable distance, it neither approaches nor recedes from the equator or the

Questions.—486. What are the principal causes which determine climate? 487. What principally determine the temperature of a country? Why is the greatest heat experienced within the tropics? What happens as we recede from the equator? 488. Why is the latitude of a place of the first importance in determining its temperature? Is this true of countries lying between the tropics? 489. Explain why a greater degree of heat prevails at the tropics than at the equator.

ut has a direction due east and west. This ecliptic is, in point of the path or the point of *direct heat and sunlight* over the earth's surface. Thus, then, it appears, that when this point has reached its near-approach to either pole, it does not immediately turn back toward the pole, but remains at that nearest distance for a considerable time; or, here, lingers there. It has been calculated, that if the space between tropics be imagined to be divided into three equal bands of the earth, the point of direct sunlight would be found to linger in each of the two bands $3\frac{1}{2}$ times as long as in the middle band.

"This lingering of the point of direct heat and sunlight at its nearest approach to the poles, is a necessary result of that simple and admirable motion, by which the earth is made to revolve round the sun, rotating at the same time round an axis which has an inclined position, and which precludes its parallelism. The object of it is obviously to minister to the polar regions, in their due proportion, light and heat."^{*}

1. In the northern hemisphere, the countries where the greatest heat is experienced—the banks of the Senegal, the Tropic of Arabia, and Mekran in Beloochistan—coincide with the tropic of Cancer; and it has been found that the snow-line of the Andes in 17° south latitude is higher than at the equator, in evidence of a higher temperature.

2. (2) The temperature of countries is largely affected by the extent of *their elevation above the level of the sea*. As we ascend in the atmosphere the cold increases,—an effect due to the action of the air, and to the circumstance of being farther from the heat reflected from the surface of the earth. We may travel several hundred miles from the equator toward the poles, along the level surface of the earth, before we become sensible of diminished temperature; but the moment we begin to increase elevation, a rapid change of temperature is experienced, and we arrive at a point where constant frost prevails.

3. The ratio of the diminution of temperature usually given, is 1° for 300 feet of height; 2° for 595 feet; 3° for 872 feet; 4° for

Questions.—490. What is said of the lingering of the point of direct light and heat at the tropics? What is obviously its object? 491. What is said of the countries in the northern hemisphere where the greatest heat is experienced? 492. By what is the temperature of countries largely affected? What occurs as we ascend in the atmosphere? State the difference, as affecting climate, between traveling on the earth, from the equator toward the poles, and increasing our elevation. 493. Give the ratio of the diminution of temperature for different heights? What is the effect of elevation in the temperate zone?

^{*} Professor Moseley's "Astro-Theology."



ate,—the cold of Iceland and the heat of a Sicilian summer. Vines to the height of 2,380 feet above the level of the sea; trees to 6,700 shrubs to 8,500; a few plants to 10,600, beyond which are a few lichens and the vegetation ceases entirely at the height of 11,000 feet, amid ice cold.

6. The following is the extreme line of elevation above the level of the observed here of individual classes of vegetation:

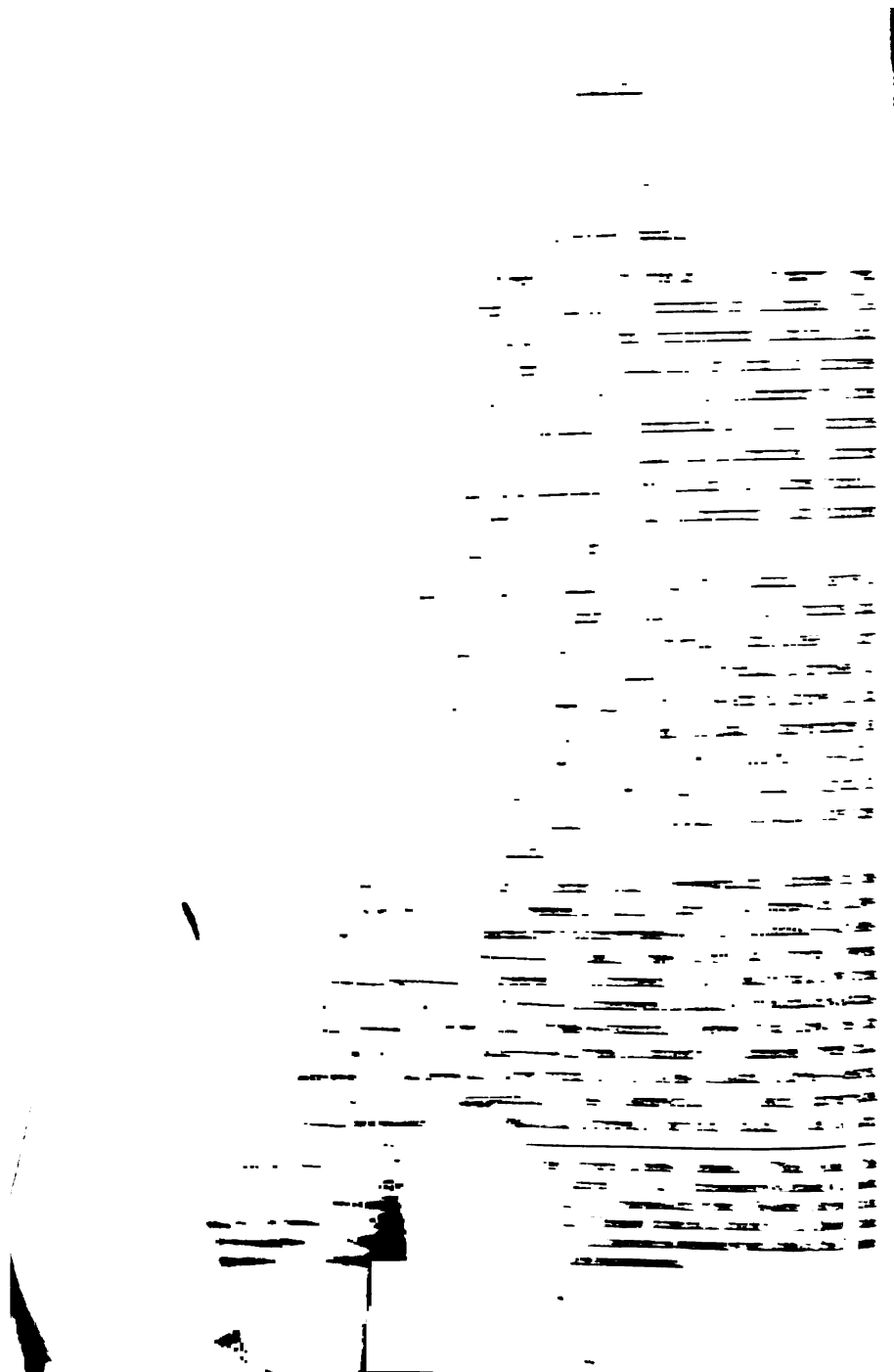
	Feet.		Feet.		Feet.
oak	2,772	The cherry	4,270	The silver birch	5,500
walnut	3,518	Potato	4,450	The larch	6,000
yew	3,620	The nut	4,500	The fir le sapin	6,300
ey	3,740	The beech	4,800	Pinus cembra	6,600
	4,180	Mountain maple	5,100	Rhododendron	7,400

7. Etna is divided into three districts, each of which has a climate very different from either of the others. They are called *La Regione Culta*, or fertile region; *La Regione Sylvestris*, the woody region; and *La Regione Sterilis*, the barren region. The productions of these districts are as different from each other as are those of the three zones of the earth.

8. The Island of Teneriffe, with its celebrated Peak, presents another illustration of the effect of elevation on climate. The Peak, which rises to a height of 12,176 feet, has several zones of vegetation, arranged one above the other, extending through a perpendicular elevation of 11,190 feet, to which vegetation ascends in that tropical latitude. The region of *Vines* is from the level of the sea to a height varying from 1,200 to 2,000 feet. In this zone the date-tree flourishes, the sugar-cane, the plantain, the Indian fig, the olive, wheat, and the fruit-trees of Europe. The region of *Laurels* includes the woody part of Teneriffe, in which a hardy species of laurel, as the oak, the laurel, etc., abound. Next comes the region of *Pines*, filled with trees resembling the Scotch fir. Higher still may be found species of grasses which reach nearly to the line of perpetual snow.

9. The delightful climate of the valleys of Cashmere, and of portions of Hindoostan lying on the declivities of the Himalaya Mountains, is owing to the elevations of those regions above the level of the sea. In these districts, as well as on the table-land between the eastern and western Ghauts, the temperature throughout the year is that of perpetual spring. The inhabitants of Quito, at an elevation of 9,540 feet, experience a genial and almost variable climate, in which vegetation never ceases, while on the one hand, behold the mountain ridges covered with perpetual snow, and at the distance of a few leagues, an intense and sickly degree of heat oppresses the plains and lower levels.

Questions.—496. What is the extreme line above the sea-level reached by certain classes of vegetation? 497. How is Etna divided? What are the districts called, and what is said of the productions? 498. What is said of the zones of vegetation on the Peak of Teneriffe? 499. Climate of Cashmere and of Hindoostan? Quito?



inding in rivers; and which, in those parts of the country that are the best distant from mountains and from the ocean, give rise to enormous seas of water, which are either attracted by them, or are formed during the acts of vegetation: all these causes produce, in the lower parts of Africa, a climate which, from its coolness and humidity, is singularly contrasted with that of Africa. To these causes alone must we ascribe that abundant vegetation, so vigorous and so rich in juices, and that thick and rageous foliage, which constitute the characteristic features of the new continent."

03. (4) *The slope of a country, or the aspect it presents to sun's course*, has an important influence on its climate. The angle at which the sun's rays strike the ground, and consequently the power of those rays in heating it, varies with the exposure of the soil to that luminary. The irregular surface of the earth, sunk into deep valleys in some parts, and raised into table-lands and mountains in others, with slopes at all possible angles to the general level,—presents every variety of inclination to the varying obliquity of the sun's rays.

04. The effect of aspect is, of course, most strikingly seen in regions covered with high mountains. "Under a vertical sun, the sides of the Andes receive the sun's rays as obliquely as they fall in our latitudes upon the earth's level surface,—nay, as obliquely, perhaps, as they fall in summer upon the level surface of the snows of Spitzbergen; while the Alps encounter on parts of their southern slopes as direct a heat as that which melts up the desert of Sahara; and on their northern they are as much cooled from the sun's influence as are the level snows of Lapland.

05. "In the Alps of the Valais, on the one side you may see the vine in luxuriant growth, when the other is thick ribbed with ice. Thus, too, the races and sloping plains which descend from the vast table-land of Central Asia, where, inclining from its northern limit, they pass into the steppes of Siberia, present, under the latitude of Edinburg, a cold intense enough to freeze mercury; while upon the southern terraces of the opposite Himala-slope, flourish, at different elevations, the pineapple, the mango, the cotton-tree, and the saul. This tropical vegetation ascends there to an altitude of four or five thousand feet; mingling itself, and by degrees giving way to the plants of a temperate region,—elms, willows, roses, and destined in their turn, at a yet higher region, to yield to Alpine vegetable life."*

*.—503. What is the fourth cause which determines the climate of a country? 504. What is the effect of aspect? 505. How is the effect of aspect exhibited in the Alps? On the Himala-slope?

* Professor Mosley's "Astro-Theology."

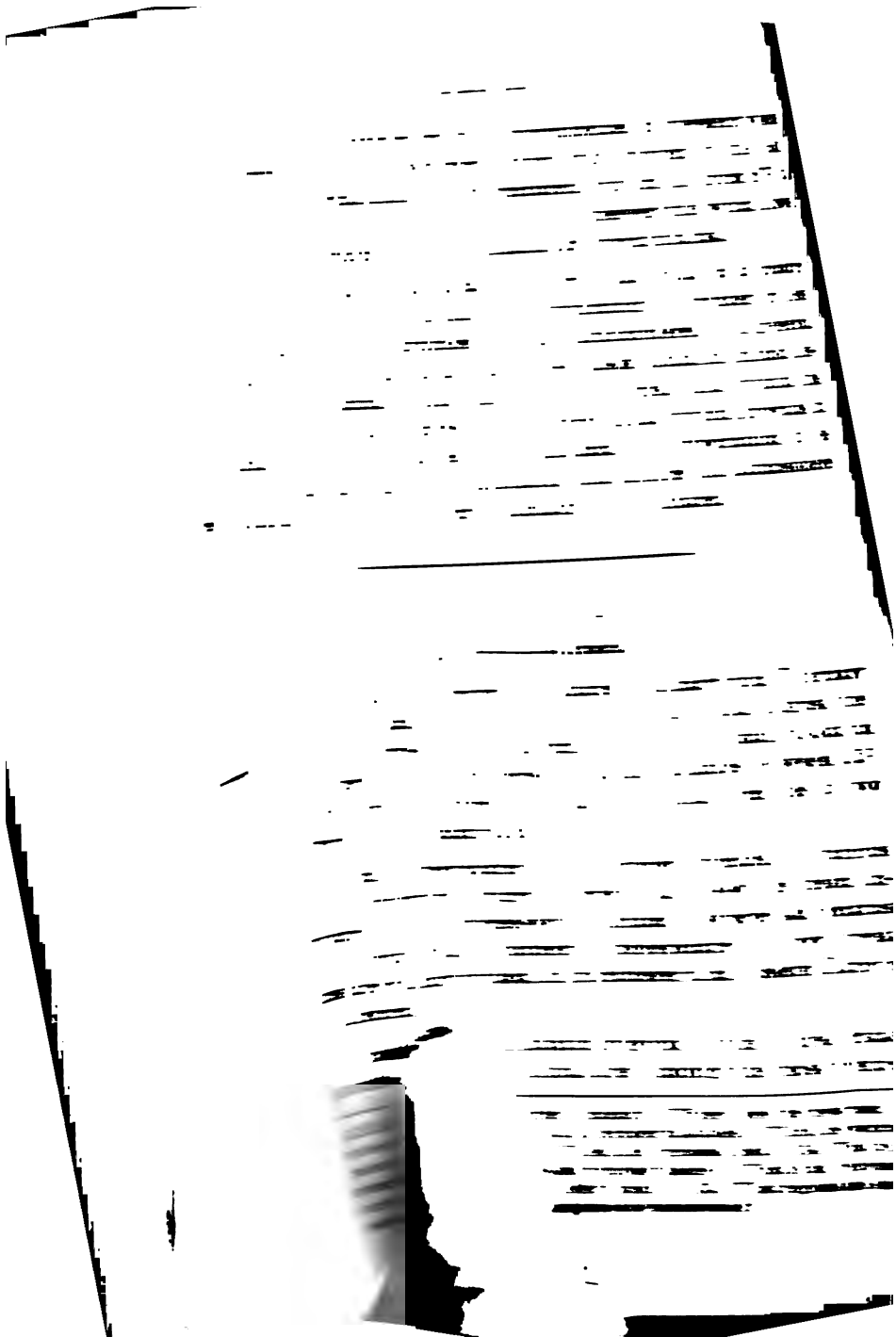


Thus clayey or marshy grounds lower the temperature, especially in hot and humid climates, affect the atmosphere in a manner pernicious to health. On the other hand, those which are light, stony, or calcareous tend to make the atmosphere salubrious. The great cold, and the unwholesome air, which prevail in the Russian governments of Astrakan and Orenburg, owing to the north of the Caspian Sea, are attributed partly to the saline nature of the soil; and it is well known that the tracts of sand in Africa and Arabia conduce not a little to excessive heat of those countries.

1. (7) *The degree of cultivation and improvement at which a country has arrived.*—The clearing of forests, the draining of swamps and marshes, the cultivation of the soil, etc., are among the operations of man by which the climate of a country is greatly modified and improved. The clearing of a country from trees has the effect of raising the mean annual temperature, but at the same time greater extremes of heat and cold are introduced. In the north, the grounds are always frozen deeper than woodlands, but they retain the snow and ice of winter to a much later period in the spring than the former. In the cleared portions of North America, the winters are known to be much less severe now than formerly, when woods spread over a greater part of the country. There is little doubt that many parts of Europe enjoy a milder climate now than they did in the time of the Romans, even at periods much more recent.

1. (8) *The prevalent winds of a country constitute another cause which affects its climate.* This is obvious enough from what has been said in the lessons on Winds, from which we learn that the character of a wind depends upon the region from which it comes. In the United States the winds from the north are generally noted for their coolness, a property they derive in common with the regions of Hudson and Baffin Bays, while those from the south, coming from the Gulf of Mexico, impart a mildness to the whole country. The comparatively mild climate of

9. Effect of different kinds of ground on temperature? Illustrate how each affects climate? Effect of clearing a country from trees? 511. What is the climate? The north winds of the United States? The south winds? The mild climate of the British Isles, to what owing? How is the climate of certain winds in Venezuela?



," the winters and summers strongly contrasting in their tem-
 perature. New York has the summer of Rome, and the winter
 of Copenhagen. At Quebec, grapes sometimes ripen in the open
 whereas the winter is that of St. Petersburg, during which
 snow lies from three to five feet deep for several months.
 Peking, in China, the scorching heats of summer are greater
 than at Cairo, and the winters as rigorous as at Upsal.

3. The following table gives the difference in the mean temperature of
 the coldest and warmest months at different places :

Places.	Latitude.	Coldest Month.	Warmest Month.	Difference	Observations.
Paris.....	48° 27'	40.1°	54.4°	14.3°	Uninterrupted trade-winds.
London.....	51 55	46.1	51.4	5.3	Monsoons. Radiation of sands.
Amsterdam.....	52 36	48.0	56.9	8.9	Monsoons.
Cruz.....	19 11	70.0	81.7	11.7	North winds in winter.
François.....	19 46	77.0	86.0	9.0	Uninterrupted trade-winds.
St. Louis.....	38 10	70.0	83.8	13.8	North winds in winter.
Algiers.....	36 37	64.0	75.6	11.6	Insular climate.
Oran.....	31 38	46.9	78.8	31.9	Interior region.
Madrid.....	39 06	29.6	74.4	44.8	do. do.
Constantinople.....	39 54	24.8	84.2	59.4	Region of eastern Asia.
Alexandria.....	30 56	29.8	77.0	47.2	Eastern America coast.
New York.....	40 40	25.8	80.8	55.0	do. do.
Philadelphia.....	41 58	42.1	77.0	34.9	Southern Europe. do.
San Francisco.....	45 28	38.8	55.2	16.4	Interior land.
San Diego.....	47 29	27.6	71.6	44.0	do. do.
San Jose.....	43 50	35.1	69.8	34.7	Nearer the western coast.
San Juan.....	47 18	39.0	70.0	31.0	do. do. do.
San Pedro.....	60 07	24.2	61.8	37.6	North Europe.
San Carlos.....	46 04	14.0	78.4	64.4	Eastern America coast.
San Juan.....	58 21	37.6	60.8	23.2	Insular climate.
San Juan.....	55 58	38.8	59.4	20.6	do. do.
San Juan.....	52 14	27.1	70.8	43.7	Interior land.
St. Petersburg.....	59 56	08.6	65.7	57.1	Northern Europe.
Cape.....	71 00	22.1	46.6	24.5	Climate of coasts and islands.

7. *Isothermal* lines (signifying lines of equal heat) are those
 places which have the same, or nearly the same, tem-
 perature. These lines do not coincide with the parallels
 on that there are other causes besides solar action
 on climate, as explained in the last two lessons.
 A logical map shows, by the use of isothermal lines,
 which have the same, or nearly the same, temper-
 atures attached to each curve indicate the mean
 temperature of the region traversed by it.

In the northern hemisphere, the curve line on the map, indicating
 a temperature of 80°, crosses Central America about the
 latitude of St. Domingo, descending across the At-

What are isothermal lines? Why do not these lines coincide with the
 regions are crossed by the isotherm of 80°?

The image is a high-contrast, black and white scan of a document page. It is heavily distorted by numerous horizontal black lines and noise, which appear to be either redactions or artifacts from a poor-quality scan. The text is completely illegible due to these obstructions. The layout suggests a standard document with multiple lines of text, but no specific content can be discerned.

onding latitudes in eastern America, as is indicated by the equality of the isothermal lines about the meridian of Florida. This is due to a variety of causes. 1. The prevailing winds being from the southwest, come from the equatorial region and partially bear the heat of the tropics to the shores of America. 2. The warm waters of the Gulf Stream, which crosses the Atlantic to the neighborhood of Europe, elevate the temperature of the coasts that are washed by them. 3. The Gulf Stream, it is true, runs along the east coast of America from Florida to Cape Hatteras, but the current is there very weak and the prevailing winds carry the hot superincumbent air away from the shore. On the other hand, a sea current flows down from the Arctic Ocean to the coasts of Labrador and Newfoundland, which contributes to depress the temperature of the cold waters, but chiefly by the floating icebergs that descend with it.

With reference to climate and productions, the globe may be divided into the following regions,—the hot, warm, temperate, and frigid.

6. The *Hot Regions* occupy a zone extending on each side of the equator to a few degrees beyond the northern and southern tropics. Here abound the finest spices, the sugar-cane, the palm and banana tribes. It includes the islands and mainland of eastern Asia, the middle and northern countries of Africa, and the central parts of America.

7. The *Warm Regions* extend from the northern limit of the sugar-cane to the northern boundary of the olive and fig; they include the southern districts of Europe, part of midland and western Asia, and portions of the southern United States. The frosts here are not severe in the plains; snow is rare and the rivers are seldom frozen over. The winters are distinguished for dampness than cold, resembling the spring of the temperate regions. Vegetables on the south of this zone grow seven or eight months of the year, and the trees shed of their foliage more than two months.

Into what regions may the globe be divided with reference to climate?
 526. What are the limits of the Hot Regions? What abound there?
 527. Where do the Warm Regions extend? What distinguishes them?
 528. What characterizes these regions?

528. The *Temperate Regions* reach from the northern region of the olive and fig to that of the grape-vine, and have a mean temperature varying from 50° on the northern border to 59° on the southern. The transition from winter to summer is here gradual, and the four seasons are distinctly marked. Grain, vegetables, and many fine fruits are produced in abundance, with excellent pasturage. The northern part of the United States is included in this region, with France, Germany, southern Russia, Holland, Belgium, England, and Ireland, in Europe.

529. The *Cold Regions* include the country between the grape-vine and the northern limits of the oak, or midland Russia and southern Scandinavia, in Europe, southern Siberia in Asia, and the British Provinces in North America. The summers are short, hot, and oppressive, and the winters severe and protracted. Nearly six months in the year the temperature of Stockholm and St. Petersburg is below the freezing point.

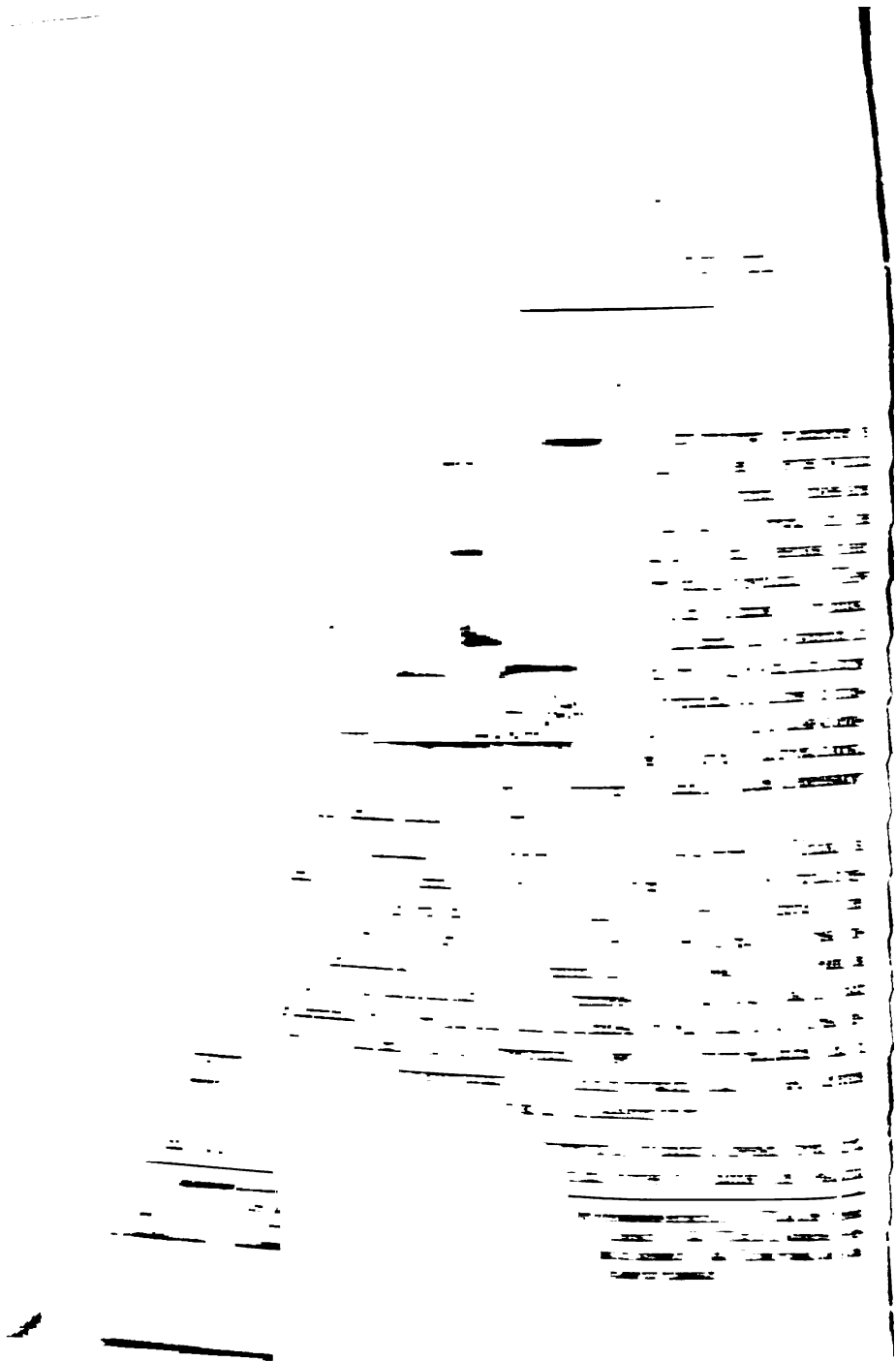
530. The *Frozen Regions* extend from the northern boundary of the oak to the pole. The birch, the hardiest of trees, generally ceases to grow about latitude 70° in Europe, where man is compelled to give up the cultivation of grain. Shrubs and vegetation linger on farther north; grasses and lichens then are only to be met with; and eternal snows and ice succeed. In regions north of 59° in Asia, 71° in Europe, and 54° in America, the mean annual temperature is below the freezing point. Around Hudson Bay and in North Siberia, lakes and standing water of no great depth are frozen to the bottom; the inhabitants remain crowded together in small huts; and if the cold air suddenly enters a habitation, the vapors fall in a shower of snow.

531. Observation in high northern latitudes has pretty nearly determined the fact that the point of greatest cold is not coincident with the pole, but that the lowest temperature is found at two points situated at about 78° of latitude, and 95° west longitude and 130° east. Captain Parry, who wintered at Meville

Questions.—528. What are the bounds of the Temperate Regions? Their temperature? What is said of the seasons here? What countries are included in this region? 529. What do the cold regions include? The seasons here? 530. Where do the Frozen Regions extend? Give particulars respecting this region. 531. What has observation in high northern latitudes nearly determined? Where are the supposed points of the greatest cold?

, often observed the thermometer in the ship at 50° , and distance from the ship at 55° below zero, perhaps the low-temperature, upon which entire dependence may be placed, is been remarked. He wintered on the south coast of the in about latitude 74° , and obtained the following results of observation :

greatest heat at Melville Island, was	$+60^{\circ}$	Fahr. on the 17th of July.
greatest cold at ditto,	-50	" on the 15th of Feb.
temp. of warmest month, July....	$+42.41$	"
of coldest month, Feb.....	-32.19	"
of Winter.—Dec., Jan., Feb.	-28.02	"
of Spring.—Mar., Apr., May	-03.27	"
of Summer.—June, July, Aug.	$+37.11$	"
of Autumn.—Sept., Oct., Nov.	-00.51	"
mean temperature for 12 months ...	$+01.33$	"



color, the intensity of which increases with the brilliancy of light. "Plants always turn toward the light; the guiding power we know not, but the evidence of some impulsive or attracting force is strong, and the purpose for which they are constrained to obey it is proved to be the dependence of vegetable life upon luminous power."*

6. *Heat* is another essential which determines the condition of plants, by the amount of it which prevails during the season of vegetation. In the cold regions of very high latitudes vegetation scarcely exists, and even in the temperate zones its luxuriance is materially diminished by the severe climate of winter. The influence of heat on vegetable life is most strikingly exhibited on high mountains in the torrid zone, where the growth and luxuriance of plants diminish in proportion to elevation, and consequently in proportion to the diminution of heat.

5. Without *moisture* there can be no vegetation, and this element is supplied to the plant in three different forms: that of which the plant absorbs,—that of liquid water by which plants are surrounded, and that of moisture which the plants take up as nutriment from the earth. The development of plants is further dependent upon the chemical qualities of the soil in which they live, whether it be composed of pure or mixed earths, soil rich in clay or vegetable mold.

7. It belongs to Botany, Vegetable Physiology, and Agricultural Chemistry to investigate the structure and nature of plants, and to examine in detail the treasures of the vegetable kingdom. The business of the physical geographer is to notice the disposition of the vegetable tribes, and the circumstances which seem to regulate their distribution.

8. Scarcely fourteen hundred species of plants appear to have been known by the Greeks and Romans. At the time of

Questions.—585. Where is the effect of heat on vegetation most strikingly exhibited? What is said of moisture, and in what three forms is it supplied to plants? Upon what is the development of plants dependent? 587. What is the business of the physical geographer? 588. How many species of plants were known by the Greeks and Romans? How many at the time of Linnæus in 1762? In 1835? How many have been added at the present time? Probable number on the earth?

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... is formed every year, it is easy to determine the age of a specimen by counting the number of layers or rings. In this way, specimens of the following ages:

Example. 540. Of what two great natural divisions is the Phænogamia? What two are the Exogens? How are the latter distinguished from the endogens? By what other name are the exogenous trees be determined?

..... 335 years.	Oriental Plane, 720 years and upward.
bout 350 "	Cedar of Lebanon about 800 years.
mon about 400 "	Oak..... 810, 1080, 1500 "
..... 450 "	Lime..... 1076, 1147 "
..... 576 "	Yew 1214, 1458, 2588, 2880 "
..... 630 "	Taxodium. 4000 to 6000 "
..... 700 "	Baobab... 5150 "

The *Endogens* (*endon*, within, and *gennaō*, to produce) are which have their stems increasing from within, and present pearance of wood, pith, or bark. They comprehend the nus grasses, and the most important of all the vegetable tribes ; ly, the valuable pasture and all the grain-yielding plants, it, barley, oats, maize, rice, sugar-cane, etc., also lilies and the family. They are often called *monocotyledons* (*monos*, sin- and *kotuledōn*, cavity), from their having only one seed-lobe.

4. The CRYPTOGRAMIA, or flowerless plants, include mosses, as, fungi, ferns, sea-weeds, etc.

5. Station indicates the peculiar nature of the locality where species is accustomed to grow, and has reference to climate, umidity, light, elevation above the sea, etc. ; by habitation ant a general indication of the country where a plant grows

Thus the *station* of a plant may be a salt-marsh, a hill-the bed of the sea, or a stagnant pool. Its *habitation* may rope, North America, or New Holland, between the tropics.

LESSON II.

DISTRIBUTION OF PLANTS.

3. In considering the distribution of the vegetable species important to observe the distinction between indigenous and : plants. The former are the native productions of a coun- ie latter are those which have been introduced from abroad. number of exotic plants is comparatively small. They con- or the most part, of those species which are eminently use-

Notes.—543. What are the Endogens? What do they comprehend? By what other re they called, and why? 544. What do the Cryptogamia include? 545. What tion indicate? Habitation? Illustrate? 546. What are indigenous plants? Exotic Of what species do the exotics, for the most part, consist?

THE DISTRIBUTION OF PLANTS

1. The distribution of plants is determined by the climate, soil, and other physical factors.

2. The distribution of plants is also determined by the geographical position of the land, and by the influence of the sea.

3. The distribution of plants is also determined by the geological position of the land, and by the influence of the sea.

4. A remarkable fact, that in the more widely separated eastern continent, notwithstanding the existence of land-communication, the diversity of species is not so great as between countries separated by wide oceans.

5. The diversity of species is not so great as between countries separated by wide oceans.

6. The diversity of species is not so great as between countries separated by wide oceans.



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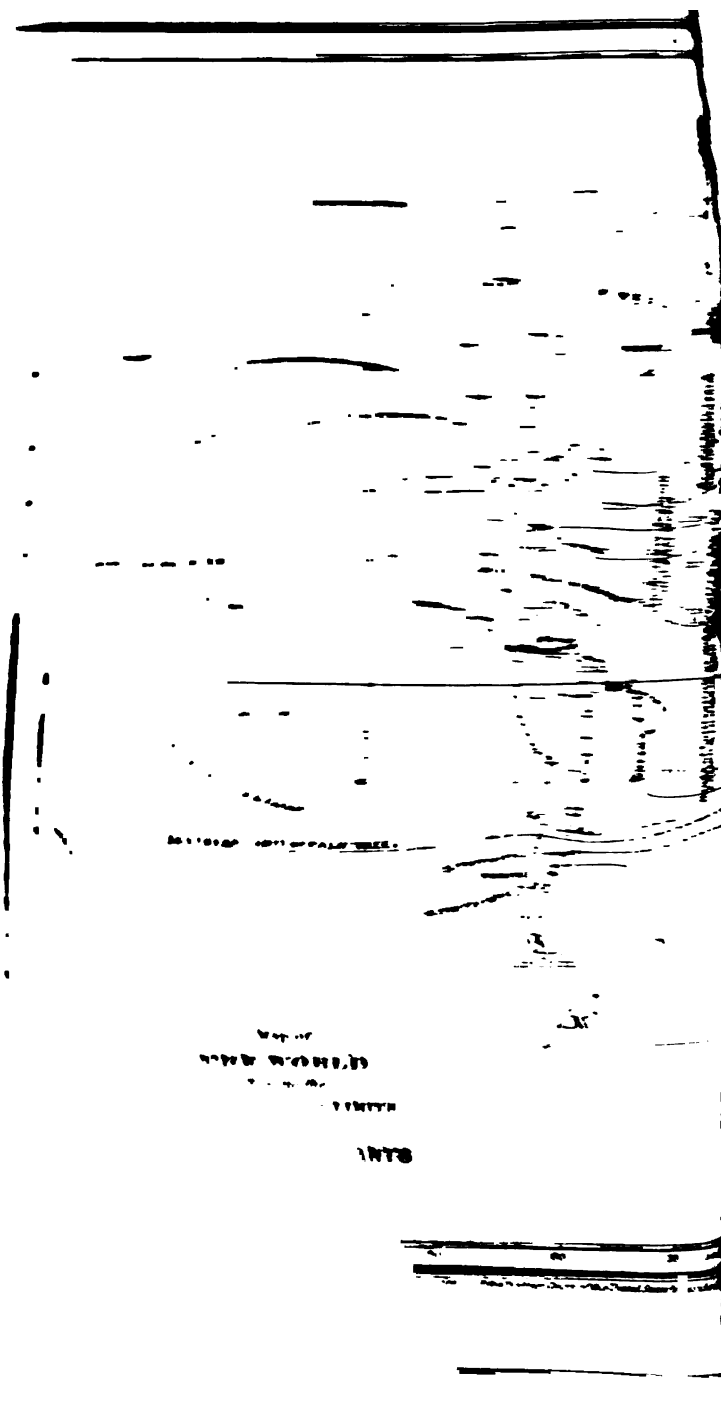
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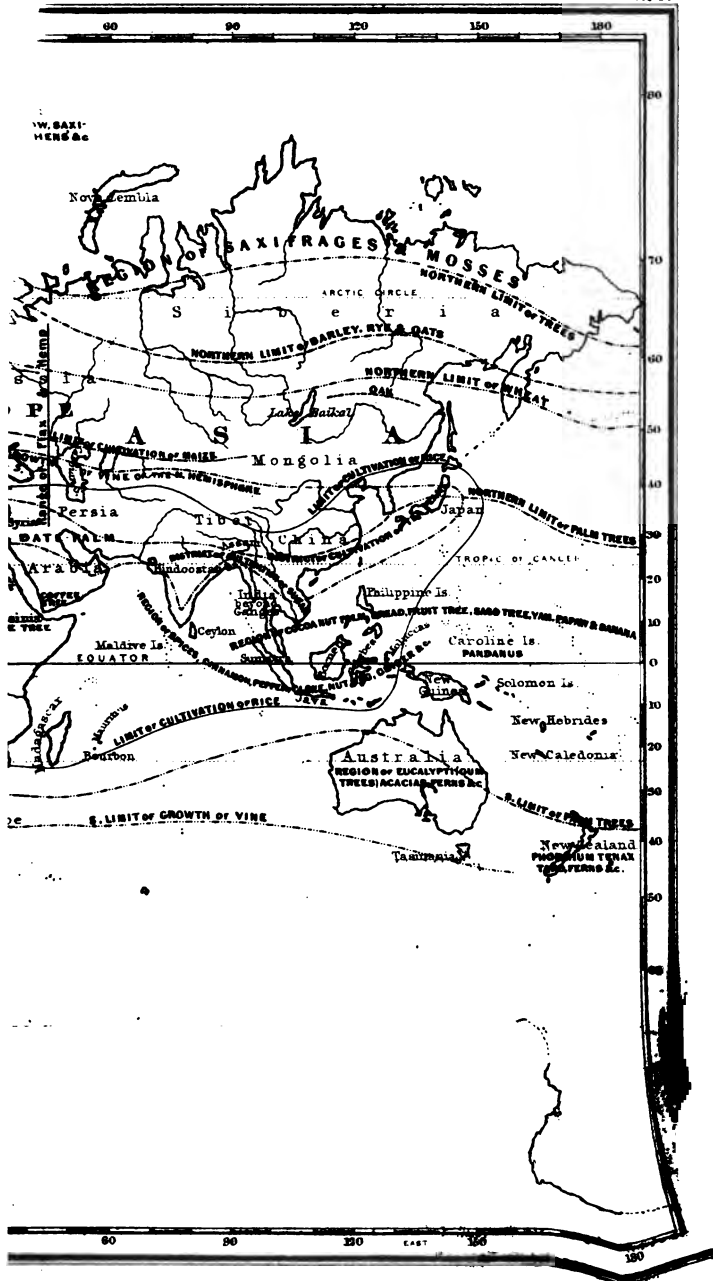
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Munich, has divided the vegetation of the globe into 51 ces, namely, 5 in Europe, 11 in Africa, 13 in Asia, 3 in Holland, 4 in North and 8 in South America, besides Cennamerica, the Antilles, the Antarctic Lands, New Zealand, Diemen's Land, New Guinea, and Polynesia.

"The first travelers were persuaded that they should find, in distant is, the plants of their own country, and they took a pleasure in giving the same names. It was some time before this illusion was dissipated; fully sensible did botanists at last become of the extreme smallness e number of phænogamous plants common to different continents, that ncient Floras fell into disrepute. All grew diffident of the pretended ification; and we now find that every naturalist is inclined to examine supposed exception with scrupulous severity. If they admit the fact, begin to speculate on the mode whereby the seeds may have been transd from one country to the other, or inquire on which of two continents plant was indigenous, assuming that a species, like an individual, can ave two birthplaces."*

52. Plants are diffused in a variety of ways. The principal ae inanimate agents provided by nature for scattering the ls of plants over the globe, are the movements of the atmoe and of the ocean, and the constant flow of water from the ntains to the sea. A great number of seeds are furnished downy and feathery appendages, enabling them, when ripe, oat in the air, and to be waisted easily to great distances by most gentle breeze. As winds often prevail for days and ks, or even months together, in the same direction, such ls may be conveyed to a great distance from the parent plant. n the heavier grains may be borne through considerable spaces he hurricanes and whirlwinds which prevail in some regions. e germs of many plants, as mosses, fungi, and lichens, conof a fine powder, the particles of which are scarcely visible he naked eye, and there is no difficulty in accounting for ir being dispersed throughout the atmosphere, and carried to oint of the globe where there is a station fitted for them.

vers aid in the distribution of vegetation by bringing
ne valleys the seeds which may accidentally fall into

52. What are the principal inanimate agents employed in scattering the plants? Explain the agency of winds. 53. Of rivers. The Gulf Stream.

* Lyell's "Principles of Geology."

unity of Africa. Our principal fruit trees appear to have traveled from the East and Great Britain from Syria; the damson plum, with the damson as their names import, from the neighborhood of Damascus; the apple from Pontus; the walnut and the peach from Persia; the apricot from Armenia; the citron, lemon, and orange from the warmer parts of

LESSON III.

FOOD PLANTS.

MAN, in almost every country, has selected *annual plants* for food; that is, such plants as complete their whole vegetative process within the course of a few months. These, for the most part, possess a subterraneous and usually tuberous stem, which in autumn shoots above the soil; after some time, flowers appear, and afterward fruit. During the remainder of the year, the plants, as it were, beneath a protecting coverlet of earth, and are beyond the influence of excessive heat or cold. By the cultivation of these plants, man has rendered himself independent of the destroying action of the dry season in semi-tropical regions, and of the killing influence of the winter cold in higher latitudes. It is remarkable that there are only three arborescent vegetables in the whole world which can be included among the food-plants, namely, the *bread-fruit*, the *cocoa-nut*, and the *manioc*; and these have become subject to culture, and furnish, in various regions, the chief articles of food for large bodies of men.

0. The following are the principal food-plants. The species of *grains*, or *cereal grasses*, which prevail, in the Old World, are *barley*, *oats*, *rye*, *wheat*, *rice*, *millet*, *sorghum*, and the *olive*; the tree-kind, the *date-palm*, *banana*, *cocoa-nut*, *bread-fruit*, *manioc*, and the *pandanus*. Those which have their origin in the New World, are the *potato*, *maize*, *manioc*, and *arrow-root*. Food-plants cultivated, to some extent in both continents, are

Questions.—559. What plants has man selected for his food? What is said of these? Which are the only three arborescent vegetables included among the true food-plants? 560. What species of food-plants prevail in the Old World? The trees? What have their origin in the New World? What food-plants are cultivated to some extent in both continents?

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It is one of the most common cultivated cereals in the world. It is a wide range grain, being raised in all the warm countries of the Eastern Hemisphere. In the North of the Atlantic and throughout North America it is raised in the middle of the Northern limit of America's agriculture; the country being well-watered. At Henderson House, one of the stations of the Hudson Bay Company, in the North, Canada, there are fields of wheat, barley, and Indian corn. Wheat grows luxuriantly in Chile and Rio de Janeiro is cultivated at 6,000 and 10,000 feet above the level of the sea. It even produces grain, in sheltered situations, on the banks of Lake Titicaca, in the Peru-Bolivian Andes, at the absolute height of 12,795 feet above the sea-level. Buckwheat is a plant of extremely extensive culture in the northern temperate zone. It is a native of Asia, from whence it was brought into Europe, in the fifteenth century.

663. *Mosses or Indian Corn* is much cultivated in Europe and America, much to the 47th parallel of latitude. In the United States the culture of this grain, of which in 1880, over 592 million bushels were raised, is

Q. Is there any other person named J. W. White? Is there any other person known to you as J. W. White? Is there any other person known to you as J. W. White?

been cultivated in the southern regions of Asia from the earliest ages. It constitutes the staple food of the inhabitants of the Indian peninsula, China, Japan, and the East Indian Islands.

Rice is the food of a greater number of human beings than any other grain. It requires excessive moisture, and a temperature of 73° at least; consequently its cultivation is limited to countries between the equator and the 45th parallel.

4. The *Olive* in the Old World embraces two zones or belts, north and south of the equator, about 9° in width, from latitude 35° to latitude 44° . The climate of the New World, however, is subject to the extremes of heat and cold, is not favorable to the cultivation of this plant. The *Date-Palm* yields one of the most nourishing fruits in existence. It grows spontaneously on the southern slopes of the Atlas chain, on the banks of the Nile, and in the Canary Islands; its range extends to the Mediterranean and Hindoostan, and it has been introduced into the West Indies and the United States. It is said that each tree yields annually from 100 to 260 pounds of fruit.

5. The *Date-Palm* is a member of the palm family, and grows chiefly within the tropics. From their noble and stately appearance, palms have been called by Linnæus, "the princes of the vegetable kingdom." Wine, oil, flax, flour, sugar, and salt, according to Humboldt, are the produce of this tribe; to which Von Marshall adds thread, utensils, weapons, food, and habitations. The cultivation of the date-palm is an object of high importance in the countries of the East. In the interior of Barbary, in Egypt, in the more dry districts of Syria, and in Arabia, it is almost the article of culture. It is a slow-growing tree. The age of a date-palm sixty feet high, it has been estimated, can not be less than 60 years. In the country between the Barbary States and the Mediterranean it is so abundant, and so unmixed with any thing else that it can be considered as a tree, that this region is called the *Land of Dates* (*Belad-el-Jareed*).

6. The *Banana* or *Plantain*, which yields a great amount of nutritious substance, is a native of the southern portion of

Notes.—564. The olive? Date-Palm? 565. What is said of the palm family of the East? What do they produce? What is remarked respecting the cultivation of the date-palm? 566. The banana or plantain? Its productiveness?

the Asiatic continent, but has been transplanted into the Indian Archipelago and Africa, and has also found its way into the tropical parts of the New World. The fruits weigh, altogether, about 70 or 80 pounds, and the same space which will bear 1,000 pounds of potatoes, brings forth, in a much shorter time, 44,000 pounds of bananas; and if we take account of the nutritious matter which this fruit contains, a surface which, sown with wheat, feeds one man, when planted with bananas, affords sustenance for twenty-five.

567. The *Cocoa-nut Palm* also belongs to inter-tropical climes, flourishing especially on islands and near the sea-shores. It is cultivated nowhere so extensively as in the islands of Ceylon, Sumatra, and Java. This tree grows to the average height of eighty feet. The nuts hang in clusters of a dozen each on the top of the tree. The fruit consists externally of strong, tough, stringy filaments resembling coarse oakum, which is formed into *coir*, and extensively used in the East for making cordage. Inclosed within this fibrous mass is the shell, of great firmness, and used for many domestic purposes. While the nut is green, the whole hollow of the shell is filled with an agreeable, sweetish, refreshing liquor. When the nut is gathered, a formation of albumen takes place upon the inside of the shell, producing that white, firm, pleasant-tasted, but rather indigestible substance, which is called the kernel of the nut. A tree generally furnishes about 100 nuts.

568. The *Bread-fruit Tree* is distributed generally among the Friendly, the Society, and the Caroline Islands. The tree is beautiful, as well as useful, and rises to the height of about forty feet; when full grown it is from a foot to fifteen inches in diameter. The fruit is green, heart-shaped, about nine inches long, and equaling a large melon in size. The nuts, when roasted, are said to be as excellent as the best chestnuts, but it is principally for the fleshy receptacle or pulp that it is valued. When roasted it is soft, tender, and white, resembling the crumb of a loaf, but it must be eaten new or it becomes hard. Others compare the flavor to that of a roasted potato. Such is the abundance

fruit, that two or three trees will suffice for a man's yearly supply.

9. The *Potato* is a native of Chile, and was first introduced Britain from Virginia, by Sir Walter Raleigh, in 1586. Of the vegetable productions especially adapted for the sustenance of man it has the widest range, extending according to boldt, from the northern extremity of Africa, to Labrador, and, and Lapland. In tropical regions an elevation of 4,000 feet is necessary for its growth.

10. The *Cassava* or *Manioc* is a shrub, a native of Brazil. The fleshy roots of this plant yield a nutritious substance, from which we obtain our tapioca. This latter article is a kind of starch, and is capable of being made into excellent puddings; it is a very wholesome food for children, and for persons whose digestive organs are feeble. A considerable quantity of this preparation is exported annually from Brazil to the United States. The *Arrow Root*, which forms a pleasant and useful aliment for children and invalids, is much cultivated both for domestic use and exportation in the West India Islands, Surinam, and in some parts of Hindoostan. It is so named from the property it is said to possess of being an antidote to the poisoned arrows of the Indians.

11. *Sugar-Cane*. The range of this plant may be said to extend to all the regions of the torrid zone. In countries where the mean temperature is not less than 64°, it extends to latitude 30° on each side of the equator in the New World, and to about latitude 35° or 36° in the Old. The native country of the sugar-cane is China, from whence it was conveyed to Arabia, Nubia, Egypt, and Ethiopia, where it became extensively cultivated. In the fifteenth century it first appeared in Europe. Shortly after the discovery of the New World by Columbus, the plant was conveyed to Hayti and Brazil, from the latter of which it usually spread through the Islands of the West Indies and the eastern part of the United States.

12. *Coffee*. This bush or tree is a native of the Ethiopian

Notes.—569. The potato? 570. The cassava or manioc? Arrow root? 571. Sugar
Of what country is it a native, and into what regions was it successively introduced?
Coffee?

highlands of Africa, whence it has been introduced into Arabia, the East and West Indian Islands, Surinam, Cayenne, and Brazil. The tree grows upright with a single stem, covered with a light-brown bark, to the height of from eight to twelve feet, and has long, undivided, slender, horizontal branches, which cross each other. These are furnished with evergreen, opposite leaves, not unlike those of the bay tree. The flowers grow in clusters at the root of the leaves, and close to the branches. They are of a pure white, and of an agreeable odor. The fruit, which is a berry, grows in clusters along the branches, under the axils of the leaves. Each berry contains two seeds.

53. Tea consists of the dried leaves of the tea tree, which is indigenous to China and Japan. It was first imported by the Dutch in 1604, and was brought into England in 1666. "The tea country" in China is situated on the eastern side between the 30th and 33d parallel of north latitude. A species of holly, called *Pongmya Tea*, grows spontaneously in the forests of Paraguay, and yields a beverage called *Mate* in Brazil.

54. The Vine comes to perfection in Europe as far north as latitude 46°, so that its profitable culture does not extend much beyond that latitude—the best wines being produced between 40° and 45° north latitude. Its range in America is limited to the same degree of 46° occurring between its northern and southern limits in the New World. The Fig is the fruit of a tree which grows in the warm countries. It is produced in India, Turkey, Italy, and various parts of Africa; but the Chinese mulberry-tree, grown in the common vineyard of tropical America, yields a fruit which, when properly prepared, furnish a substitute for wine.

55. The common vine, *Vitis rotundifolia*, is the source of the grape.

LESSON IV.

(ANIMALS.)

75. THE animal kingdom is supposed to comprehend about 5000 distinct species, of which, however, an immense proportion belong to the insect class. Its members are arranged in grand divisions, namely: 1. Vertebrated animals. 2. Molluscous animals. 3. Articulated animals. 4. Radiated animals.

76. *Vertebrated animals* are those which have a vertebral column, or back-bone. This class is subdivided into four orders: 1. Mammalia, or animals which suckle their young. 2. Birds. 3. Reptiles. 4. Fishes.

77. Mammalia, or mammiferous quadrupeds, stand at the head of the animal creation, and are distributed into eight groups; though they differ greatly in appearance and habit, they nevertheless correspond in one particular, that of suckling their young. The groups, with some of their types, are as follows: 1. *Quadrumanæ* (four-handed),—monkeys, apes. 2. *Carnivora* (flesh-eaters),—cat, hyena, lion, bear, civet, glutton, mole. 3. *Insipida* (pouched),—opossum, kangaroo, wombat. 4. *Rodentia* (gnawing),—beaver, porcupine, squirrel. 5. *Edentata* (toothless), sloth, armadillo, ornithorynchus. 6. *Pachydermata* (thick-skinned),—elephant, rhinoceros, hippopotamus, zebra, tapir, horse, ass, boar, and badger. 7. *Ruminantia* (chewing the cud),—camel, ox, goat, sheep, deer, antelope, giraffe. 8. *Cetacea* (belonging to whales),—whale, dolphin, narwhal, seal, porpoise.

78. Birds are distributed into the following six divisions: 1. *Rapaces*—birds of prey; 2. *Scansores*—Climbers; 3. *Oscines*—Songsters; 4. *Gallinæ*—Hen-like birds (*gallina*, a hen); 5. *Grallatores*—Waders; 6. *Natatores*—Swimmers. The known number of species is upward of 6,000.

79. Reptiles are distributed into four divisions, as follows: 1. *Chelonia*—Turtles; 2. *Sauria* (Lizards); 3. *Ophidia* (Serpents); 4. *Batrachia*—Amphibians.

Molluscous, or soft-bodied animals, are those which have no bones, but whose muscles are attached to a soft skin, which is covered with a hard case or shell. In this

—575. How many distinct species is the animal kingdom supposed to comprehend? 576. What are the grand divisions of the animal kingdom? 577. What is said of the mammalia? 578. Into what six divisions are the birds distributed? 579. What are the four divisions of the reptiles? 580. What are molluscous or soft-bodied animals? 581. Into what four orders does this class include?

class there are six orders: 1. Includes those which have their heads furnished with feet, as the cuttle-fish, nautilus, etc. 2. Those of wing-like feet, as the clio, the chief food of the whale. 3. Those creeping on the stomach,—the slug, snail, limpet, and whelk. 4. Headless, as the oyster, muscle. 5. Arm-like feet, as bivalve shells. 6. Thread-like feet, as the barnacle.

581. *Articulated animals* are those in which the body is divided into joints or rings, sometimes hard and sometimes soft, which supply the place of a skeleton; this class consists of four orders: 1. *Anelides*, or ringed worms, as worms, leeches, and centipedes. 2. *Crustacea*, animals covered with shells, as crabs, lobsters, shrimps, and locusts. 3. Spiders, scorpions. 4. Insects of various families, as flies, bees, wasps, and butterflies.

582. *Radiated animals* are so called because they have their organs arranged like rays proceeding from a center: they are also called *zophytes* or *animal plants*, from their resemblance to some families of vegetable forms. This class contains five orders, which include *star-fishes*, *sea-urchins*, *sea-nettles*, *corals*, *madrepores*, *infusoria*, and microscopic animals.

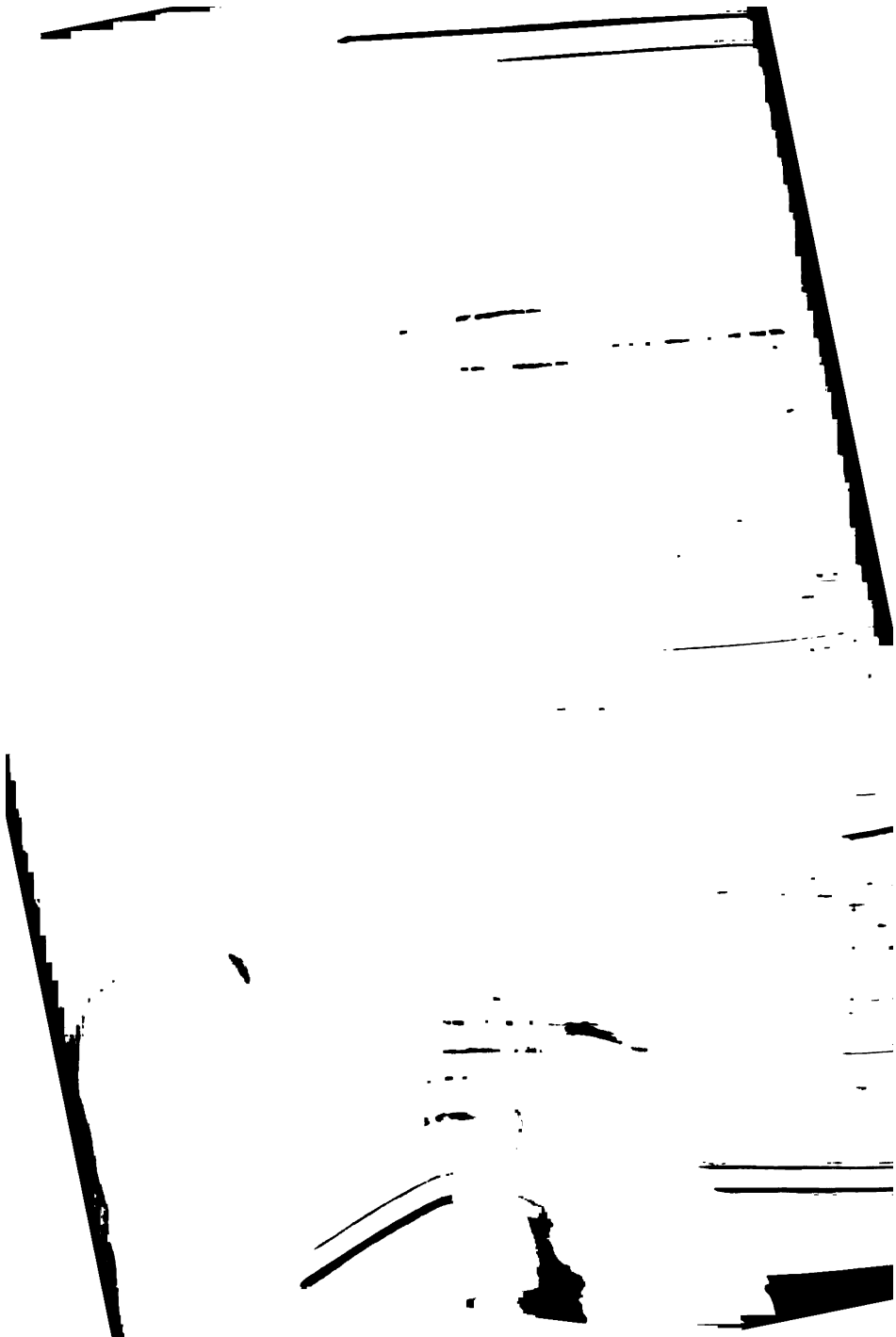
LESSON V.

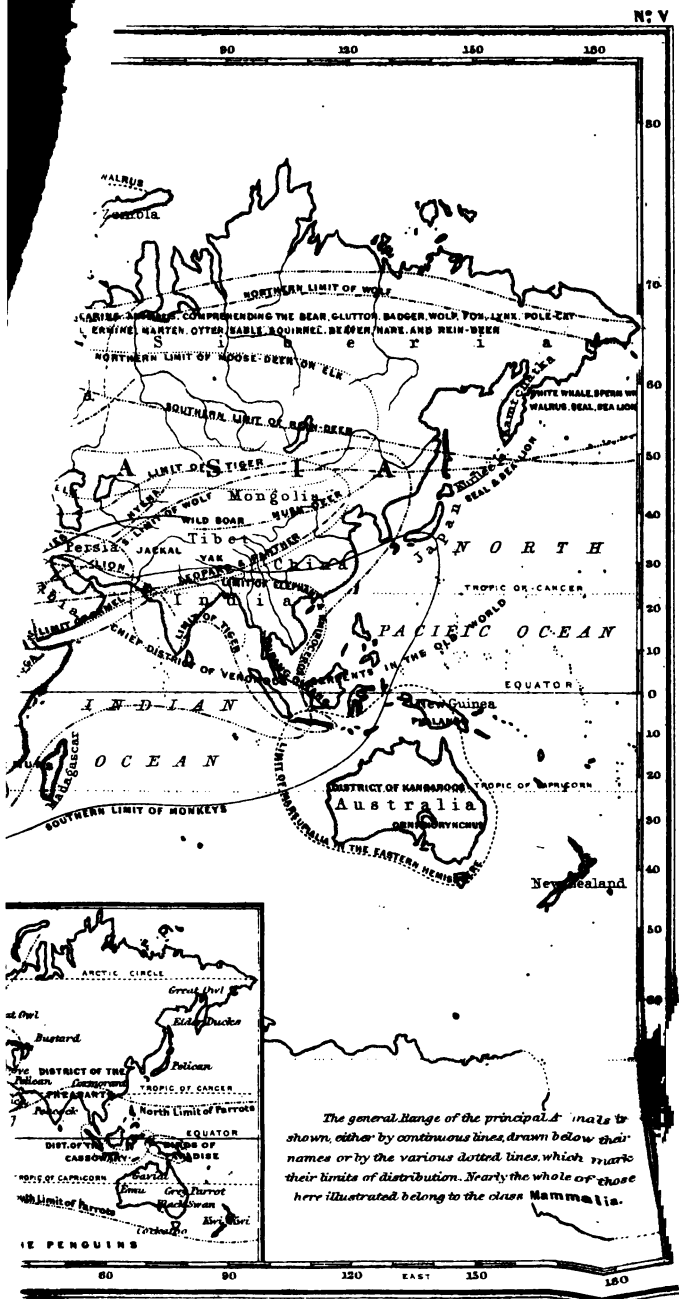
DISTRIBUTION OF ANIMALS.

583. ANIMALS exhibit a wonderful diversity in their organizations, from the gigantic forms of the elephant and whale to the atom so minute that the strongest magnifying-glass is required to detect its individual existence. By the use of the microscope it is ascertained that every leaf of the forest, flower of the garden, and drop of water, teems with myriads of living beings, utterly inappreciable by the unaided senses of man, yet perfectly organized according to their grade. The variety of form, size, strength, and uses, found among animals, with their adaptation to every existing climate and soil, are evidences of the power, wis-

Questions.—581. What are articulated animals? Of how many, and what, orders does this class consist? 582. Why are radiated animals so called? By what other names are they also called? What animals are included in this class? 583. What is said of the diversity in the organization of animals?







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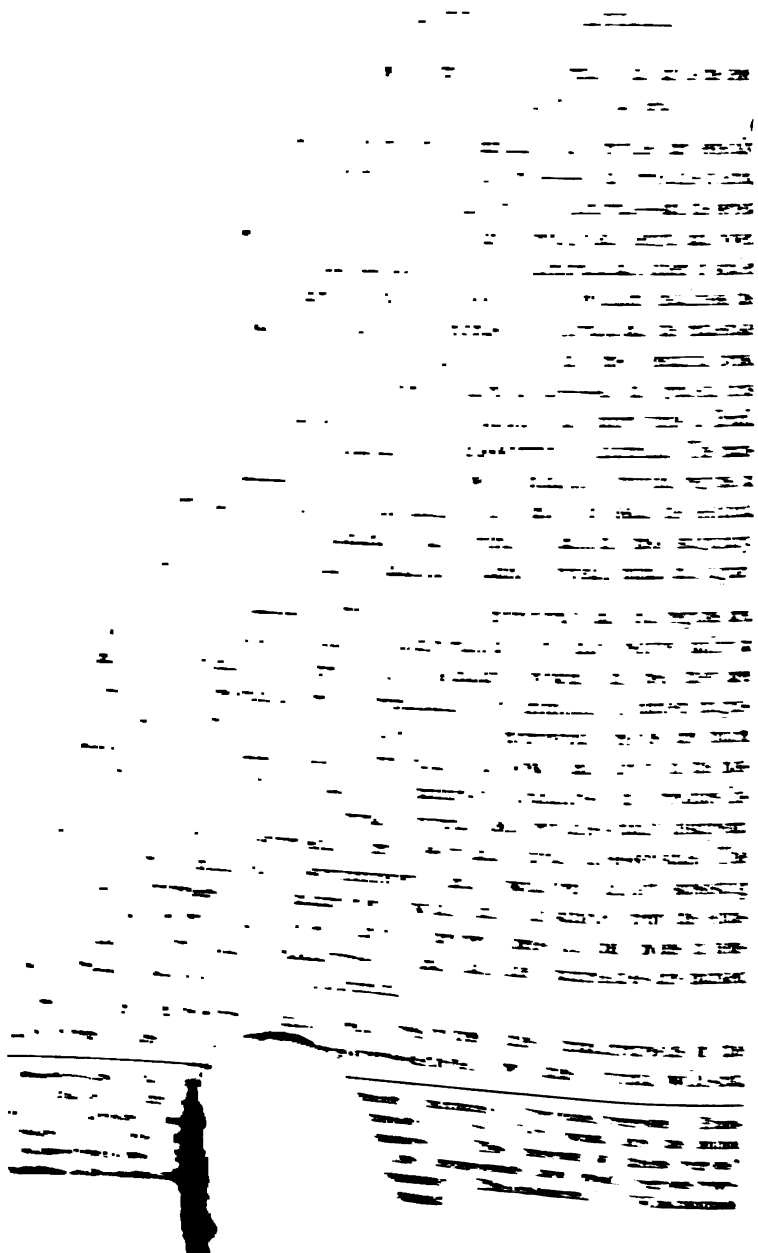
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and goodness of the Creator: for, while some beasts of with poisonous reptiles, and mischievous insects, are only ges to the human race, the greater number of the animal are subject to the control of man, and contribute essentially subsistence and comfort.

4. It is in the regions within the tropics that we find animal life, like vegetable existence, most intensely developed, here we consider the number of individual, or of species, or qualities of size and strength. The coral-forming tribes, which belong to the lowest or radiated order, are chiefly confined to those parts of the ocean which lie in the torrid zone. (For account of the structures of these animals, see Lesson V., I.) Of the molluscan class, marine shell-fish, of uniform size and appearance in cold latitudes, become larger and on approaching the equatorial seas. Among articulated animals, the arachnidæ, spiders and scorpions, attain an enormous size in the torrid zone; the butterflies are magnificent; and the insect class, in general, occur in such numbers, as frequently to become formidable, laying waste the earth, and driving nations before them. The termites, or white ants of India and Africa, build pyramids of clay to the height of ten or twelve feet, sufficiently compact to sustain the weight of several men,—far more wonderful works, in proportion to the size of the builders, than the pyramids of Egypt.

5. No part of the world is so remarkable for the profusion of insect life as the regions of the Orinoco, and other great rivers of tropical America. Humboldt informs us that at no season of the year, at no hour of the day or night, can rest be found in those districts in the upper Orinoco are deserted of these insects. Different species follow one another with such precision, that the time of day or night may be known from their humming noise, and from the different sensations which the different poisons produce. The short interval of a few minutes between the departure of one and the arrival of their successors, for the

4. Where is animal life most intensely developed? What is the most common? Of the molluscan class? Of the articulated animals? 585.
tropical countries?



fox, wolf, and bear; the rodents, or gnawing animals, porcupine, squirrel, rat, mouse, hare, and beaver; the ruminants, which chew the cud, by various species of the ox, sheep, and deer tribes; and the cetacea, inhabitants of the ocean, porpoise, seal, walrus, narwhal, and whale. The herbivorous reindeer, elk, and musk ox; and the carnivorous Arctic and white polar bear, are restricted to the coldest climates, the herbivorous rhinoceros and elephant and carnivorous tiger and hyena are to the hottest.

89. The animals of temperate and cold districts are generally remarkable for a tendency to be gregarious or social. Wolves hunt in packs; beavers form a colony; the wild goats and mountain sheep, with the domestic breeds, associate in flocks; the bison, or American buffalo, is rarely seen solitary on the prairies of the Missouri, but has membership with a vast herd; the reindeer, with other species of the tribe, have eminently the same characteristics. The gregarious tendency of some kinds of fish is observed in the immense shoals of herrings and mackerel that visit our coasts, and the salmon and shad that flock in our rivers, at certain seasons of the year. Many kinds of birds are remarkably gregarious, of which the wild pigeon of America is an example.

90. Animals are adapted to different climates and diverse physical circumstances, by clothing, differing in quantity and quality. The quadrupeds of the torrid zone are furnished only with a coat of short and thin hair; but with increasing latitudes, and abundant fleeces become common; while, in still colder regions, the beaver, sable, ermine, and bear are supplied with the best furs. The aquatic tribes of birds which swim in the waters of high latitudes, are supplied with a compact coat of feathers, which abound most upon the breast, as it, in swimming, first meets and cleaves the cold fluid. The whale, which permanently dwell in the cold ocean, derive protection from the chilling waters by the enormous amount of a bad conductor, which surrounds their bodies.

—589. For what are the animals of the temperate and cold regions adapted? 590. What is said of the adaptation of animals to different climates?

— 11 —

— 12 —

— 13 —

— 14 —

— 15 —

— 16 —

the chimpanzee, the blue-faced baboon, and the four-fingered ; are exclusively African. A few of the species inhabiting thern confines of this continent, such as the dromedary, and jackal, are common to Asia. The elephant of Africa is r, has a head more nearly round, and larger ears than that ia, and has only three instead of four nails on each hind In like manner, not one of the three African species of the eros agrees with any of the three kinds found in India.

. *Thirdly.* The *Southern* region of *Africa*, where that ent extends into the temperate zone, constitutes another te zoological province. This region is cut off from the ies of milder climate in the northern hemisphere by the in- ing torrid zone. Here may be found peculiar species of the eros, the hog, and the hyrax, among the thick-skinned and among the ruminating, the Cape buffalo, and a variety arkable antelopes, as the springbok, the oryx, the gnou, veral others.

. *Fourthly.* The island of *Madagascar*, though separated africa by a channel only 300 miles wide, forms another ce, all the species, except one, being peculiar. This dis- distinguished by the number of monkeys of the Lemur which inhabit it.

. *Fifthly.* Another of the great nations of terrestrial mam- is that of *India*, containing a great variety of peculiar forms, s the sloth-bear, the musk-deer, the nylghau, the gibbon g-armed ape, and many others. *Sixthly.* A portion of the . *Archipelago*, embracing the large islands of Java, Suma- d Borneo. A few of the species inhabiting these islands mmon to the continent of India, but most of them are t.

. *Seventhly.* The islands of Celebes, Amboina, and *New* : constitute another region, in which are found many mar- quadrupeds. Of this region Lyell remarks : " As we pr

ma.—594. What is said of the southern region of Africa? What animal here? 595. What is said of the island of Madagascar? 596. What form o India? What is said of the species inhabiting the Indian archipelago? ands of Celebes, Amboina, and New Guinea? What does Lyell remark o

MAMMAL DIVISION.

... from Celebes to Amboina and ... types diminishing in ... (marsupial forms) increasing. ... pouched quadrupeds have ... tree-kangaroos; yet ... the flying opossum, is ... of Australia."

... was discovered, its land quad- ... marsupial or pouched ... opossums, kangaroo- ... it has been ascer- ... species of marsupial ... thirty-two are ex-

... vast zoo- ... very rarely ... The influence of cli- ... New York are of quite a ... and also from ... the quadrupeds ... the musk- ... numerous species of fur-

... the most ferocious ... the prairies ... the Mississippi.

... the most insect with the ... which the mam- ... The monkey tribe, which ... infer widely from ... prehensile tails, ... separated nostrils. The ... bats or vampires, ... South America.

the land quadrupeds inhabiting Australia as is dis-
tributed of North America? Of the influence of climate
on some of the principal quadrupeds of this divi-
sion? Illustrations.

LESSON VII.

MAN.

THE number of the human race is variously estimated 10 to 1,000 millions. The impossibility of stating it with a degree of precision arises from the fact, that in but few countries any enumeration of the inhabitants ever made; while there are vast and populous regions which have scarcely been visited by civilized man. The best opinion appears to be that 900 millions is a close approximation to the real number.

Mankind, pre-eminently distinguished from the lower animals by the high endowments of reason, conscience, and speech, differ from them in consisting only of a single species. They are geographically diffused through almost every climate, from the hottest to the most frigid. Under the scorching rays of the tropical sun, upon the banks of the Senegal, the human body supports a heat which causes alcohol to boil; and in the regions of northeast Asia it resists a cold which freezes the liver.

Few lands have been discovered destitute of a native human population. Iceland, Spitzbergen, Nova Zembla, Madeira, St. Helena, the Falkland Isles, and South Shetlands, groups in the Pacific Ocean, as the Galapagos Isles, and a number of small islets, with all the lands within the Antarctic circle, were uninhabited when first made known to Europeans, but have, in several instances, since been colonized. The range of man extends from the 75th parallel of north latitude to the 55th of south latitude. The most northern dwellers are the Esquimaux, on the shores of Baffin's Bay; the most southern are the inhabitants of Tierra del Fuego.

On man's capability of accommodating himself to a great diversity of circumstances, Dr. Paley remarks: "The human animal is the only one naked, and the only one which can clothe itself. This is one of the

na-601. How is the number of the human race variously estimated? number? 602. How are mankind distinguished from the lower animals? the wide diffusion? 603. What regions were uninhabited when Europeans? Between what parallels does the range of man extend? the use of Dr. Paley's remarks.

LESS IV

[illegible]

There is no vegetable matter which is found to be most abundant in the vegetable kingdom in the greatest abundance in the temperate regions. In the temperate regions, the most abundant is the cereals, and the various kinds of grain, roots, and tubers. As we approach the tropics, the abundance of the cereals decreases, and the abundance of the various kinds of grain, roots, and tubers increases. As we reach the Seminoles and the various kinds of grain, roots, and tubers, the abundance of the cereals decreases, and the abundance of the various kinds of grain, roots, and tubers increases.

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5. 4. 2.

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Abstract

8. Taking the *shape of the skull* as the basis of a classification, mankind are divided into five grand classes, or races—the *Asiatic*, *Mongolian*, *Ethiopic*, *American*, and *Malay*.

609. In the *Caucasian*, the head is common-
f the most symmetrical
pe, almost round; the
head of moderate ex-
t; the cheek-bones ra-
r narrow, without any
jection; the face straight
l oval with the features
erably distinct; the nose
rrow, and slightly arch-
; the mouth small, with
e lips a little turned out,
pecially the lower one; and the chin full and rounded.

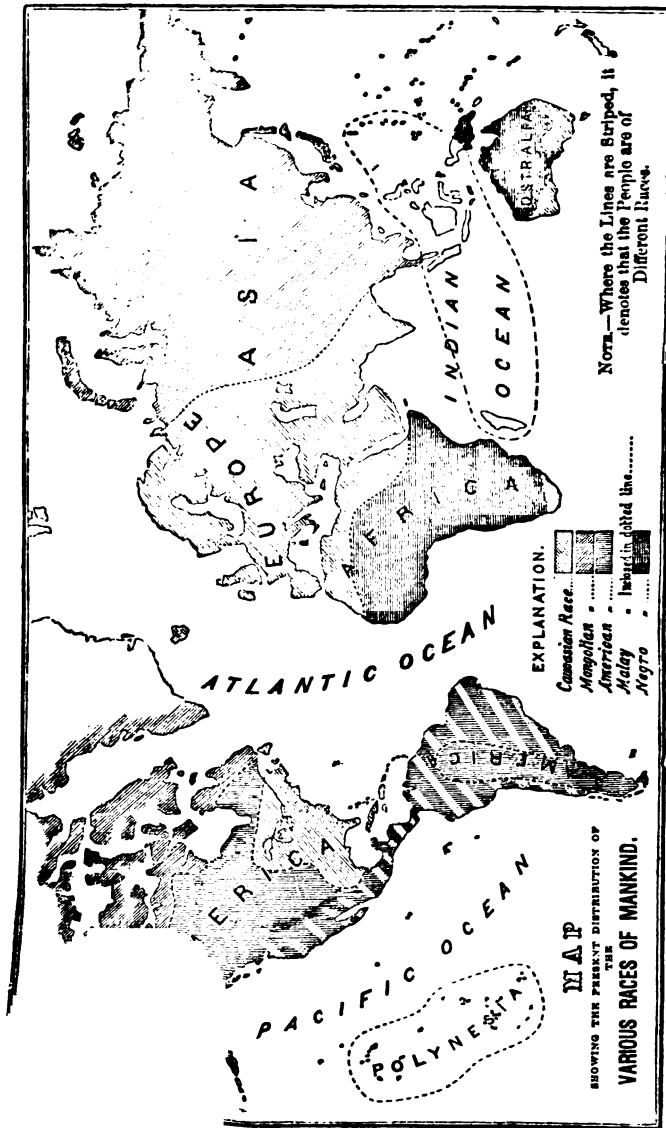


610. The most perfect examples of this variety are found in the regions of western Asia, bordering on Europe, which skirt the southern foot of the Caucasus mountains, from whence the class derives its name, and which is near what is supposed to be the parent spot of the human race. Here are the Circassians and Georgians, among whom are found the most exquisite models of female beauty.

611. The Caucasian race comprises the ancient and modern inhabitants of Europe, except the Laplanders and Finns, the Turks, and the Magyars of Hungary. It comprises also the inhabitants of western Asia, as far as the river Ganges, the Africans who live on the shores of the Mediterranean, the Egyptians and Abyssinians, with those Europeans who colonized America, and other parts of the world.

612. In the *Mongolian* race the hair is coarse, straight, and the eyes rise in an oblique line from the nose to the temples. The arches of the eyebrows are scarcely to be perceived.

Ques.—608. Into what classes are mankind divided, taking the shape of the skull as a basis of a classification? 609. Describe the Caucasian race. 610. Where are the most perfect examples of this variety found? 611. What people belong to this race? 612. Describe the Mongolian race.



the face is broad and flat, with the parts imperfectly distinguished. The complexion is generally of a tawny or olive color, and is described as intermediate between that of the European and of dried orange, varying from a tawny to a swarthy or dusky brown.

613. This division embraces the tribes that occupy the central, east, north, and southeast parts of Asia; the people of China and Japan, of Tibet, Bootan, and Indo-China, the Finns, Laplanders, and Hungarians of Europe, and the Esquimaux on the shores of the Arctic Ocean. A portion of this family is distinguished for a considerable degree of culture, especially the Chinese and Japanese, but owing to their exclusive social system, which has separated them from the rest of mankind, they have made but little progress for ages.



614. The *Ethiopic* race have black eyes, black woolly hair, flat noses, thick lips, and a projecting upper jaw. The forehead is retreating, and the head less globular than that of the European.

The best examples of this race are the negroes south of the Sahara, in Upper and Lower Guinea, Soudan, and Nubia. The natives of Senegambia and the Kaffres of the southeastern part of Africa resemble others of this race in their jet-black color, and some of their features, but they are taller, more slender, and better proportioned than the rest.



Questions. — 613. What people are comprised in this division? 614. Describe the *Ethiopic* race. Where are the best examples found?



This division
the principal
Indian Archi-
all the island-
Pacific, ex-
ose which be-
the Ethiopic va-



The diffusion of
over the globe has
ed in the course of
er the influence of
causes. The pressure

tion in one district outstripping the means of subsistence, the love
prise, the spirit of acquisition, social disturbances, and foreign vio-
ve contributed to scatter the human family far from the common
where the race originated. Endowed with intelligence to devise
of surmounting natural barriers—mountains, deserts, rivers, lakes,
ocean,—there is no difficulty in accounting for the geographical
of man. The contiguity of the mainland of northeastern Asia to that
thwestern America, with the nearly-connected chains of the Japan,
ie, and Aleutian isles intermediate, point to the New World as having
ved its original population from the Old in that direction. In modern
s, adverse winds have driven Japanese junks across from one continent
e other; and, probably, more frequently than we are apt to imagine,
s have been compelled to expatriation by the tempest, surviving its perils,
colonizing distant isles and archipelagoes.”—*Rev. Thomas Milner.*

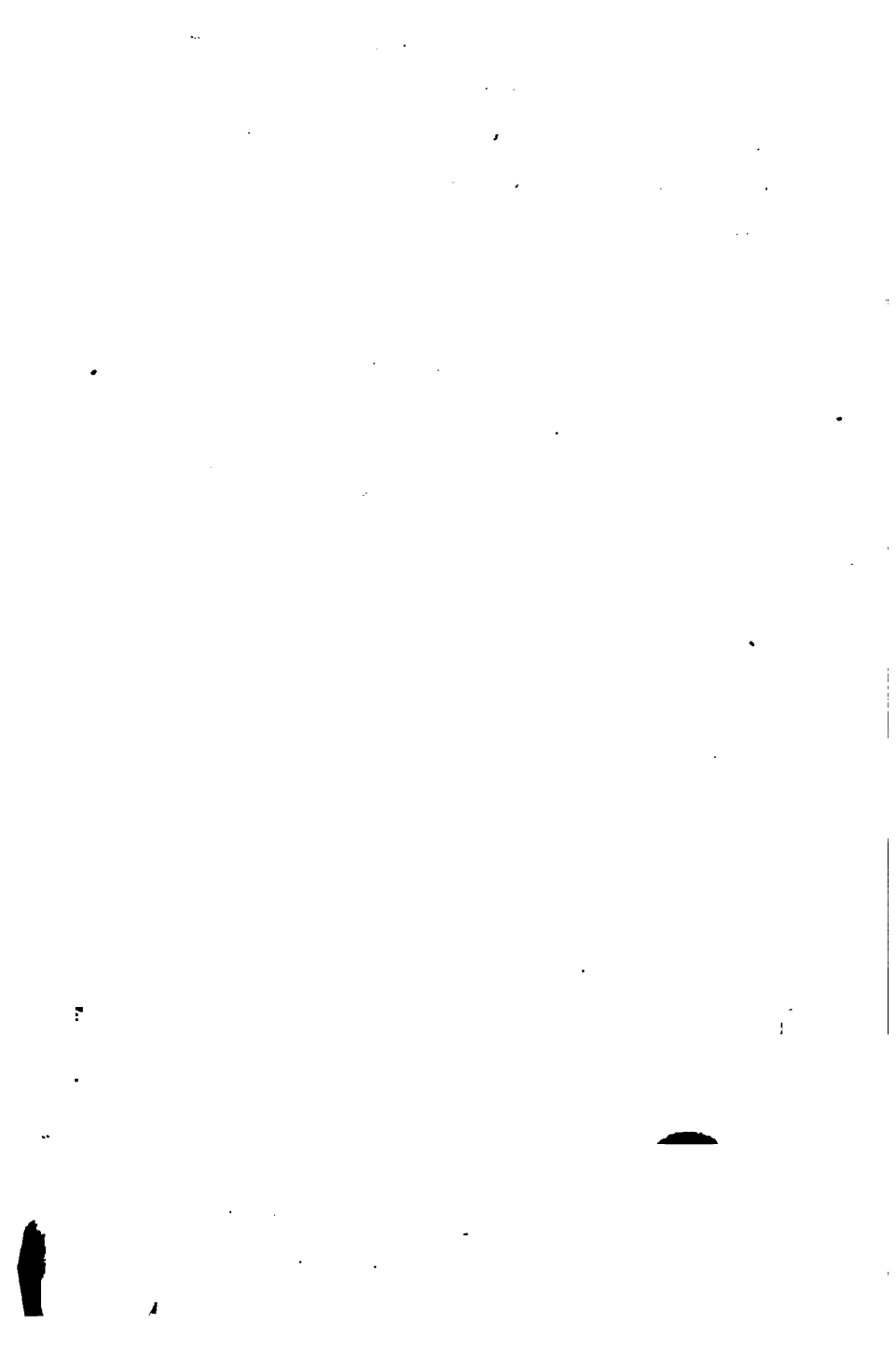
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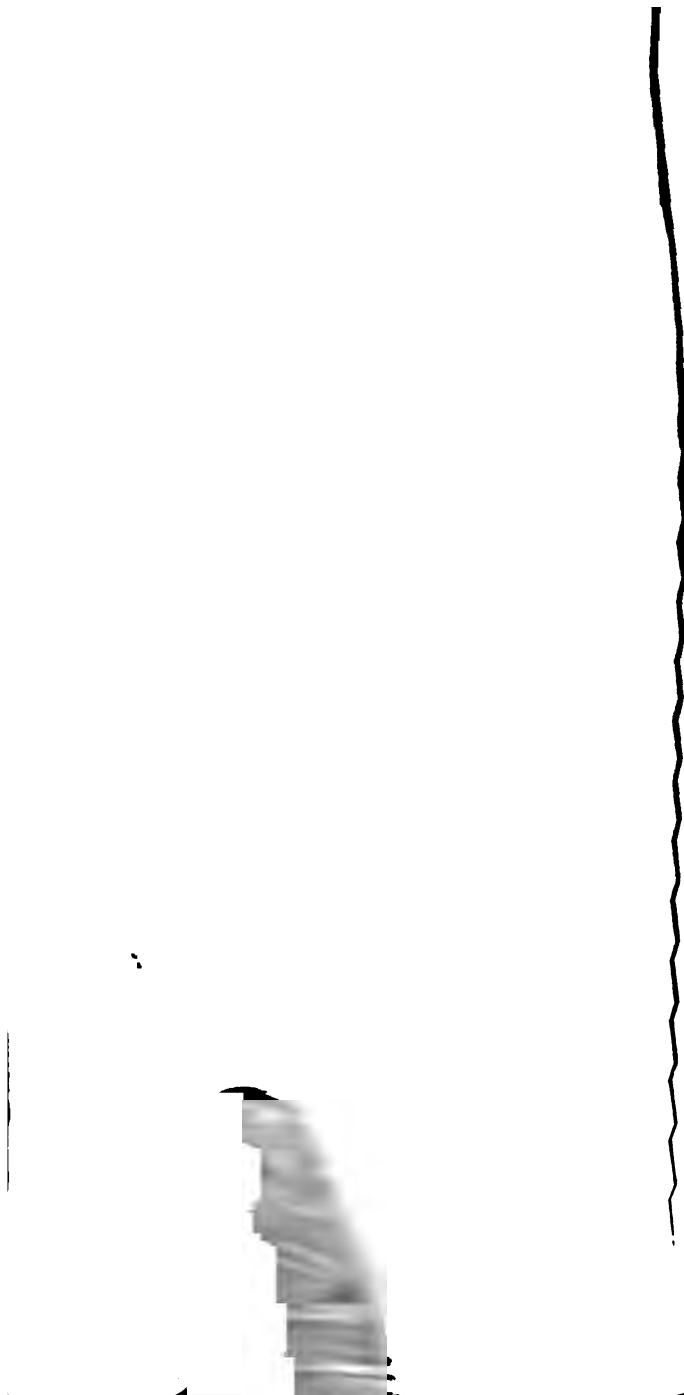


Map of
THE WORLD
 THE DIVISION OF
PRODUCTIVE INDUSTRY
 AND LANDS AND SPACES
 AND THE PRINCIPAL CITIES OF THE
CONTEMPORARY CIVILIZATION





NUMBER OF INHABITANTS TO A SQUARE MILE.		ANTARCTIC CIRCLE	
377,500	59	Prussia	107,894 16,115,000 150
600,000	192	Russia (European)	2,000,000 54,000,000 27
8,000,000	120	Spain	182,270 12,287,000 67
1,000,000	1	Sumatra	2,500,000
8,000,000	10	Sweden	170,240 3,158,000 18
1,700,000	4	Switzerland	14,600 2,186,000 150
1,168,000	9	Turkey (European)	210,000 12,000,000
6,000,000	16	United States, etc.	1,525,618 17,100,000
1,350,000	3	Native of Oregon & California	463,000 1 50,000
2,500,000		Venezuela	
3,400,000	82		



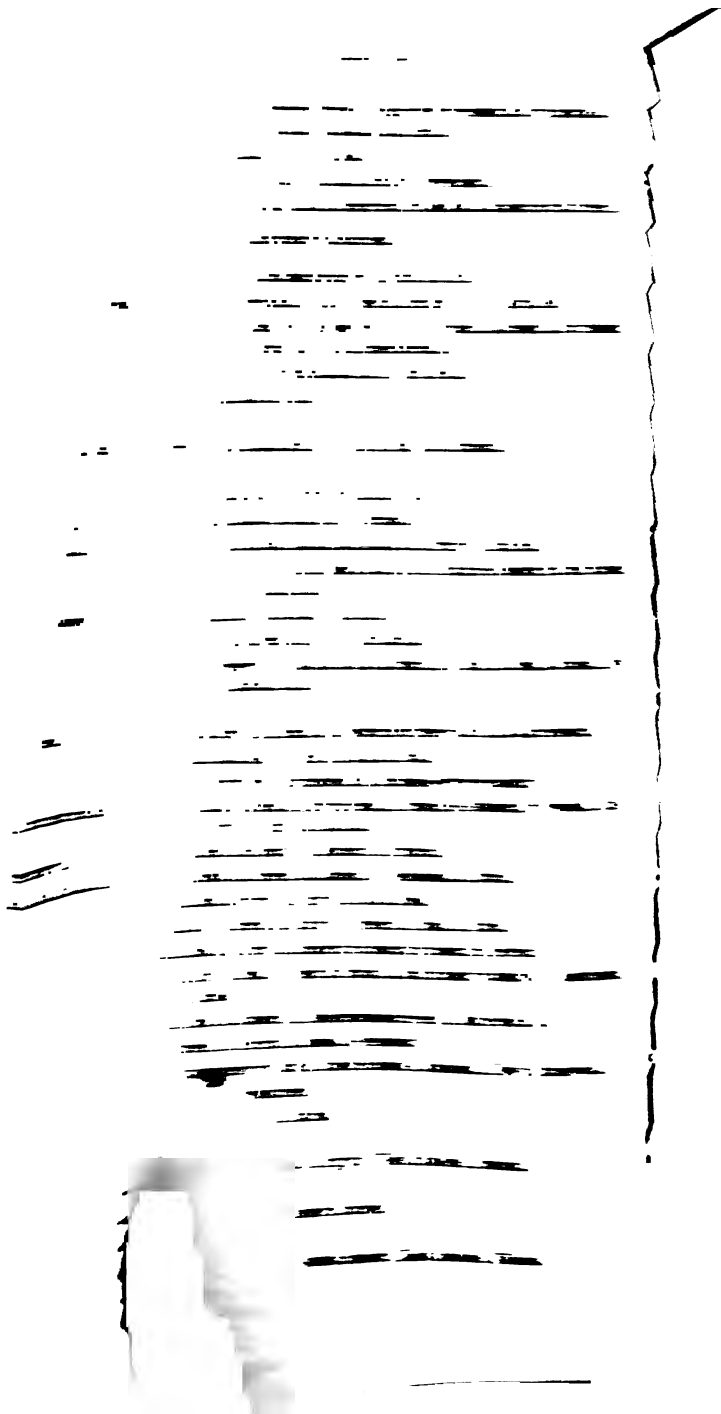
A P P E N D I X.

PRODUCTIONS OF THE EARTH, AND THE COUNTRIES FROM WHICH THEY ARE PRINCIPALLY DERIVED.

.....	Sicily, Germany, Scotland; India; South Africa.
STEEL	Spain, Italy, France, Germany, Ireland.
DS	Syria; Northern Africa; Spain, Portugal, and France.
.....	Socotra I.; Arabia; East Indies; Barbadoes.
.....	Prussia, Sicily; Mozambique, Madagascar; Japan.
EGGS	Madagascar; Guiana; Java, etc.
WINE	Brazil; Ceylon, India, Siberia; Germany, Sweden, and Spain.
OVIES	Northern coast of the Mediterranean Sea, Atlantic coast of France and Portugal.
E-SKED	Spain, Germany; China.
ES	Extensively cultivated in most temperate climates, especially in the United States.
OTTO (<i>otter</i>)	West Indies, Guiana, Brazil; and East Indies.
OW-ROOT.	South America, West Indies, Bermuda Is.; Madeira Is.; East Indies.
HEALTHUM	Trinidad I.; Dead Sea, etc.
AFGETIDA	Persia, and those parts of Beloochistan and India near the mouth of the Ganges.
UMBOO } ANANA }	All intertropical countries.
ARILLA.	United States; Spain, Sicily; Canary Is.; East Indies.
ABLE	North America between lat. N. 35° and 60°, and all temperate climates.
ELAC	th of England.
BERA	Indies; Islands of the Pacific; East Indies; Malaysia, etc.
BUCK	h America between lat. N. 35° and 60°, and all temperate climates.
LAMP	ochin China; Japan, Malaysia, etc.
LAOUT	entral America, Guiana, Brazil, etc.
LASHA	ina, Malaysia, East Indies; and West Indies.
WESTA	editerranean coasts, Italy, France, Spain, Turkey, etc.
UNNA	ylon, Cochin China, China; Brazil, etc.
IRON	adeira Is.; Spain, Italy; Persia, China.
YET	ell, Guiana; Africa; Sumatra, East Indies, etc.
	becca Is.; Guiana, etc.
	nsylvania; Wales, etc.

APPENDIX.

.. Germany and Turkey;
 .. United States, Canada; England, Germany,
 .. West Indies, Mexico, Central America; East India
 .. Brazil, Venezuela, New Granada, Peru.
 .. Great Britain, Russia, Sweden; United States
 Russia.
 Africa generally; East Indies, Cochin China.
 Mexico.
 Germany, France, Spain.
 East Indies, Malaysia.
 Inois, Wisconsin, Iowa, Missouri; Great Britain, Germany,
 Spain.
 rmany, Hungary, Sweden, France.
 at Indies; Southern Europe, Azore Is.; Eastern Asia, etc.
 in, Southern Europe.
 tal America, West Indies.
 cca Is., Sumatra; Mauritius, etc.
 nd, Italy, France; Asia Minor, Afghanistan.
 Hayti, Central America. Its culture extends
 ern temperate and tropical countries. Its culture extends
 the 50th degree of N. latitude to the 40th S. latitude.
 pine Islands, East Indies.
 reece; Egypt; Siberia; Great Britain; United States.
 : Northern Africa; Spain, the Levant, etc.
 7, Poland; India; Africa.
 or.
 -producing countries.
 ina; west coast of America.
 na, Persia; the Levant, Italy, Spain, etc.
 ina, and the table-lands of Asia.
 ubia; East Indies.
 ; Sumatra; Mauritius, etc.
 abar, and Coromandel coasts.
 n in cool climates.
 ; Great Britain, Italy, etc.
 Italy, Spain; Asia Minor; Brazil.
 oe Is., Saxony; Honduras, South America.
 v; East Indies.
 al, Azore Islands, Italy; China; West I
 nds of the Pacific.
 oe.
 coast of Africa; India, etc.



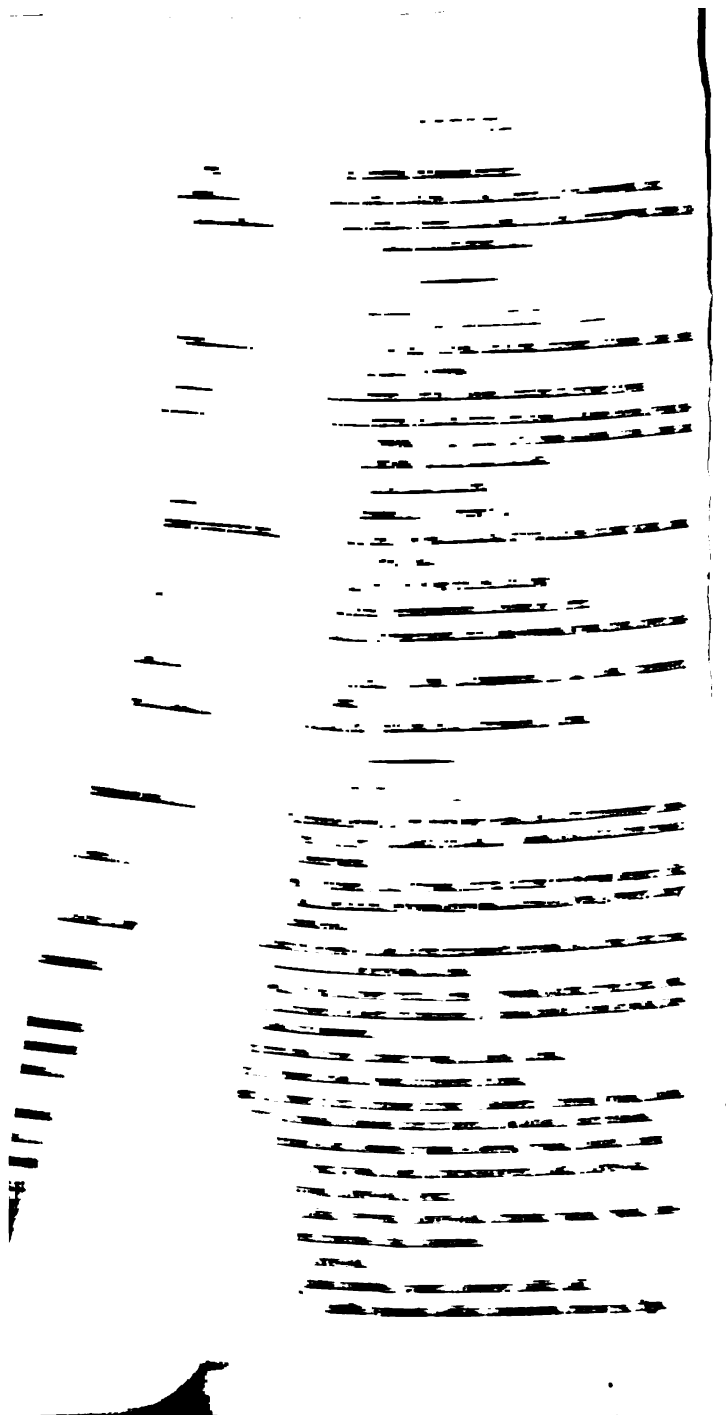
TOBACCO	United States, Cuba, Canada; Turkey, Germany, France; Southern Europe and Southern Asia generally;—and all tropical countries.
TOPAZ	United States, Mexico, South America; East Indies; Egypt; Siberia.
TORTOISE-SHELL	East Indian Archipelago, Singapore.
TUMERIC	Bengal, Java, China.
TURQUOISE	Persia, East Indies, Ceylon.
VANILLA	Central America, Brazil, Ecuador.
VINE	Southern Europe; Northern Africa; and throughout America within the temperate zone.
WALNUTS	Spain, France, Italy, Turkey.
WHEAT	All temperate climates.
WINES	<i>Port</i> —Province of Upper Douro in Portugal;— <i>Sherry</i> —Xeres near Cadiz in Spain;— <i>Claret</i> —Bordeaux in France;— <i>Champagne</i> —from a province in France of the same name;— <i>Burgundy</i> —ditto.;— <i>Madeira</i> —from the Madeira Islands;— <i>Malmssey</i> —ditto.;— <i>Tenerife</i> —from the island of Teneriffe;— <i>Marsala</i> —Sicily; and <i>Cape-wines</i> from South Africa.
YAMS	West Indies; East Indies; islands of the Pacific.
ZINC	United States; Belgium, England, Germany; China.

STAPLE PRODUCTIONS AND EXPORTS OF COUNTRIES.

NORTH AMERICA.

HUDSON BAY TERRITORIES. FURS.

CANADA	Wheat, flour, timber, pot and pearl ashes, furs, balsam, fish.
NEW BRUNSWICK	Timber, grindstones, fish.
NOVA SCOTIA	Timber, coal, gypsum, grindstones, fish, oil.
NEWFOUNDLAND	Fish, seal-skins, oil.
LABRADOR	Furs, seal-skins, fish.
UNITED STATES	Wheat, Indian corn, flour, pork, beef, wool, hemp, timber,
<i>Northwestern</i> Section, <i>north of 38° N. lat.</i> {	iron, copper, lead, zinc, coal, salt, cotton and woolen goods, machinery, hardware.
<i>Southern</i> Section, <i>south of 38° N. lat.</i> {	Cotton tobacco, rice, sugar, fruit, resin, turpentine, timber, gold, coal.
<i>California</i>	Gold, quicksilver.
<i>Mexico</i>	Gold, silver, quicksilver, cochineal, sarsaparilla, tobacco, mahogany, logwood.
<i>Central America</i>	Gold, silver, cochineal, indigo, coffee, sarsaparilla, dye-woods, hides.
<i>West Indies</i>	
<i>Cuba</i>	Coffee, sugar, tobacco, rum, mahogany, beeswax, honey, copper.
<i>San Domingo</i>	Coffee, sugar, tobacco, cotton, logwood, mahogany, ginger, wax.
<i>Puerto Rico</i>	Coffee, sugar, rum, pepper.



TURKEY	Fruits, olive-oil, madder, raw silk, cotton, opium, drugs, gum, sponges, galls, carpets, leather.
ARABIA	Coffee, dates, aloes, myrrh, frankincense, gum-arabic, asphaltum.
PERHIA	Naptha, silk, cotton, wool, carpets, shawls, tobacco, fruit, drugs, copper.
AFGHANISTAN	Horses, furs, madder, tobacco, fruit, shawls.
BELOOCHISTAN	Horses, skins, grain.
HINDOOSTAN	Rice, sugar, silk, cotton, indigo, coffee, wool, opium, saltpetre, tobacco.
SEYLOON	Cinnamon, coffee, cocoa-nut oil, coir, areco-nuts, tobacco.
BERMAN	Teak timber, cotton, rice, indigo.
LAZAY PENINSULA	Sugar, pepper, ivory, ebony, gutta-percha.
NANAN OR COCHIN CHINA	Sugar, cinnamon, anise-seed, silk, cotton, spices, gamboge, ivory.
LAH	Sugar, pepper, lac, ivory, tin, dye-woods.
HINA	Tea, silks, cotton-goods, porcelain, lacquered-ware, gums, paper, drugs, ginger.
BET	Gold, skins, goat hair, woolen cloth, shawls, musk.
SUMTRA	Shawls.
ORKINIA	Silk, cotton, wool, skins.
HERIA	Furs, gold, topaz, musk.
PAN	Copper, camphor, silk, lacquered-ware, tea, etc
WILL ISL	Furs, oil, whalebone, spermaceti.

Wax, hides, skins, leather, gums, olive-oil, wool, indigo
dates, honey.
Copper, hides, wax, oil, wool, dates, honey
Wheat, barley, Castile soap, red woollen caps, ivory, marocco
leather, etc.
ttle, hides, wool, saai, olive-oil
eat, rice, flax, cotton, gums.
ory, ostrich-feathers, senna, gums
Ivory, gold-dust.
rice, sugar, gums, fish, ivory.
old-dust, ivory, wax, gums, amber.
ool, wine, skins, hides, grain, flour.
ain, hides, cotton, ivory
iber, ambergris
ar, ebony, tortoise-shell, nutmeg.
ar, coffee, cloves.
ail, barwood, ivory
-dust, palm-oil, ivory
-oil, camwood, ivory, gold-dust, coffee, in-
ow-root, pepper

APPENDIX.

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TRADE ROUTES.

The importance of the ocean constitutes an important branch of
 a greater or less number of people of all civilized countries
 the most wealthy and powerful nations are those which
 have the most extensive commerce: as Great Britain, France, the United
 States, and Russia. Commerce has always been the basis of
 national prosperity.

The pursuits were very slowly conducted in the
 construction of vessels, which were built with
 them qualities of fast sailing, and to the prevailing winds and currents of
 they might be best employed in navigating the ocean.

The results of these inquiries have been of great service
 in navigating the sea. No one is not familiar with the wind
 sailing, and with the method of executing his voyage.

marks,—“It is one of the

seaman's duty to know where to find a fair wind, and where to fall in a favorable current. If we take a globe and trace on it the shortest way by sea to India, and then fancy that such must be the best course to follow, we shall be very much mistaken. And yet this is very much what our ancestors actually did, till time and repeated trials, and multitudinous resources, gradually taught them where to seek for winds, and how to profit from them when found."

Map 6 exhibits the tracks usually taken by ships proceeding from New York across the Atlantic, Pacific, and Indian oceans. The *outward* and *homeward* tracks, are distinguished by arrows.

ROUTE FROM NEW YORK TO SAN FRANCISCO.—The route marked on the map shows the course taken by vessels which have made the quickest passages between these ports. The pupil will notice that it is not the shortest regards distance. Between New York and the point where it crosses the equator (on or near the 30th meridian), and also between Cape Horn and San Francisco, it diverges very considerably from a direct line.

To understand this route, and others marked on the map, it is necessary for the learner to bear in mind the direction of the prevailing winds as explained in Lesson IV., Part III. From the parallel of about 30° north and south, nearly to the equator, there are two zones of perpetual winds, namely: one of northeast trade-winds on this side, and of southeast trade-winds on that. Now, a vessel sailing from New York to Cape Horn is necessarily obliged to pass through these zones. Before striking the northeasterly zone, she must make a good deal of easting, that is, proceed to the east; if this is not done they would, perhaps, carry the vessel too close to the leeward Islands and the northern coast of South America, so that she would find it very difficult to double Cape St. Roque. (See Diagram of the trade-winds, page 132.)

After crossing the equator the route extends through the South Atlantic, a great distance from the eastern coast of South America, passing in the Falkland Islands. The most difficult part of the route is that which extends from the 50th parallel in the South Atlantic to the same parallel in the Pacific. In this part of the voyage is performed the labor of doubling Cape Horn, a very troublesome operation in consequence of the continued cold westerly winds which sailors always find there. The best months for doubling the Horn are our winter and summer, excepting July. October is said to be the most unpropitious month for the passage.

After reaching the 50th parallel, the California vessel stands far out in the Pacific at a great distance from the coast. This is done to get the northeast trades in their full force; for, it is to be remembered, these are considerably impeded by the continent, and are the strongest and steadyest at a distance from shore. On passing the region of the northeast trades, the zone of the northeast trades is met with, and the track, instead of leading directly to San Francisco, is turned in a northwest direction until the vessel, in about

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Many of the other routes, as marked on the map, appear to be very cir-
cuous, and some of them are actually so; but they are such as the long
experience of seamen have found to be the best, and such, too, as would be
recommended with much experience by a commander of a vessel who was fully
acquainted with the regular movements of the air and ocean. The limits
of this book do not admit of a further explanation of the tracks of vessels.

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ing Lesson XVI., Part II. on the Currents of the Ocean, and also
 ., Part III., on the Permanent Winds, the learner may be able
 tand why particular deviations from a direct line are made in the
 outes marked on the map.

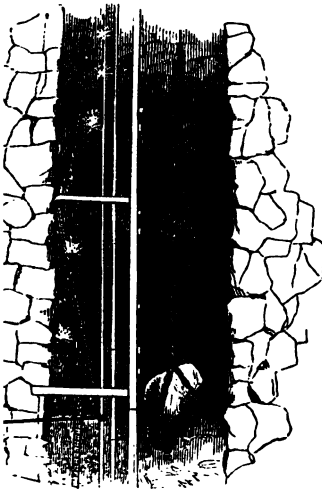
METALLIC PRODUCTIONS.

e great number of metallic substances found in the earth, those of
 test use are gold, silver, mercury, tin, copper, zinc, lead, and iron.*

erals are deposited in veins or fissures of rocks, in masses, in beds,
 netimes in gravel and sand. Most of the metals are found in veins;
 as gold and tin, iron and copper, are disseminated through the rocks,
 h rarely. The veins are cracks or fissures in rocks, seldom in a straight
 yet they maintain a general direction, and sometimes extend to an un-
 mable depth.

etals are peculiar to particular rocks: gold and tin are most plentiful
 nite and the rocks lying immediately above it; copper is deposited in
 ous slate formations; lead is found in the mountain-limestone system;

iron abounds in the coal strata;
 and silver occurs in almost all
 these formations; its ores being
 frequently combined with those
 of other metals, especially of lead
 and copper.



Shaft.

When a mine is opened, a shaft
 like a well is sunk perpendicularly
 from the surface of the ground,
 and from it horizontal galleries
 are dug at different levels accord-
 ing to the direction of the metal-
 lic veins. When mines extend
 very far in a horizontal direction,
 it becomes necessary to sink more
 shafts, which are connected to-
 gether by horizontal galleries.
 Shafts are from eight to twelve
 feet square, and are usually wall-
 ed up with timber or stone to pre-
 vent the sides from caving.

the water which filtrates through the earth would soon cool

irty-five metals are now known: they are gold, silver, platinum, c
 inc, arsenic, bismuth, antimony, nickel, quicksilver, manganese, c
 , iridium, uranium, chrome, lantanium, molybdenum, columbium, os
 m, tantalum, tellurium, rhodium, titanium, vanadium, tungsten
 erbium.

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1. The first step in the process is to identify the problem or issue that needs to be addressed. This involves gathering information and understanding the context of the problem.

2. Once the problem is identified, the next step is to define the objectives and goals of the project. This helps to clarify what needs to be achieved and provides a clear direction for the team.

3. The third step is to develop a plan or strategy to address the problem. This involves breaking down the problem into smaller, manageable tasks and determining the resources needed to complete each task.

4. The fourth step is to implement the plan. This involves putting the strategy into action and monitoring progress to ensure that the project is on track.

5. The final step is to evaluate the results of the project. This involves assessing the outcomes against the objectives and goals and identifying any areas for improvement.

[illegible]

DISTRIBUTION OF GOLD.*

UNITED STATES.—The United States contains two gold regions, of very unequal importance. The one, that of the Atlantic "Calachian gold-field," has been worked to a moderate extent for many years; the other, "the Californian gold-field," which has, since it was discovered, produced more than twelve times as much gold as hitherto been obtained on the Atlantic side.

The Atlantic gold-field extends from Georgia, in a northeasterly direction, and is developed in the following counties: in *Georgia*, in Wilkes, Cherokee, Lumpkin, and Habersham counties; in *South Carolina*, through the whole northwestern corner of the State, especially in the following districts: Abbeville, Pickens, Spartanburg, Union, York, and in *North Carolina*, in Mecklenburg, Rutherford, Cabarras, Davidson, Guilford, and Rockingham; thence through *Virginia*, in Giles, Campbell, Buckingham, Fluvanna, Louisa, Spottsylvania, Fauquier, Fauquier; in *Maryland*, Montgomery county. Gold has also been found in Canada on the Du Loup and Chaudière rivers.

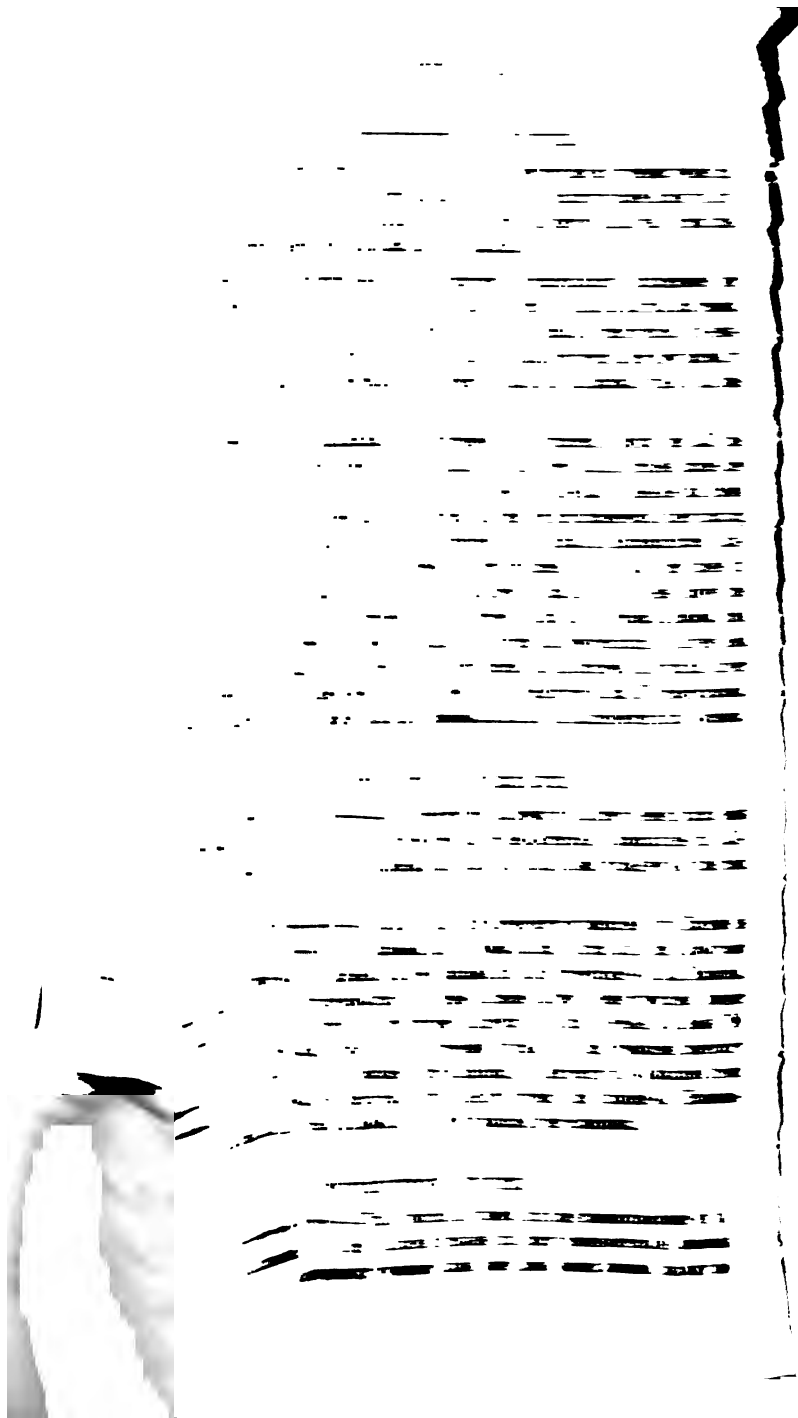
The Californian gold-field is the richest in the United States, and, compared with what we know of other similar regions, it is the richest in the world. It was first discovered in 1848, and it is calculated that, up to the year 1851, it had yielded the enormous sum of two hundred and sixty millions of dollars, and that the annual product is now about fifty million dollars. The richest mineral region is in the great valley of California, which is about 500 miles in length, and a breadth of from 50 to 100. It is bounded by two principal rivers,—the Sacramento and the San Joaquin, the former flowing south, and the latter north. The gold is most usually obtained in the form of fine particles, and scales or flattened grains, and is obtained by the separation of the metal from the earthy substances with which it is mixed. Lumps or "nuggets" are not frequent, and rarely exceed a few pounds in weight.

FOREIGN COUNTRIES.—Of the foreign countries, those most productive of gold are Australia, the Russian Empire, South Asia, the East Indies, New Guinea, Mexico, Brazil, and the Austrian Empire.

The Australian gold district is, next to that of California, by far the most productive of any known. The existence of gold there was first made known in May, 1851. The gold region embraces the southeast corner of the continent.

The annual yield is estimated at about thirty-seven million dollars. The gold of the *Russian Empire* is obtained almost entirely from the slope of the Ural Mountains, from Siberia, and in the Caucasus. It is estimated that the countries of Russia yield gold to the value of about 100 million dollars annually.

* He is indebted for the following facts, relating to the distribution of gold, to the work of J. D. Whitney, Esq., entitled "METALLIC WEALTH OF THE UNITED STATES," published by J. Pincott, Grambo & Co., Philadelphia.



ble quantity, is at Jackson, in Carroll county, New Hampshire, but it has not been obtained there in a quantity sufficient to render its manufacture profitable.

FOREIGN COUNTRIES.—The most productive tin mining region in the world is in Cornwall, *England*. The Cornish mines have been worked from an early period, the metal from which formed an article of traffic with the Phoenicians and Greeks before the time of our Saviour. It is estimated that about 7,000 tons of tin are annually made from the ores of these mines. The most valuable tin mines on the continent of Europe are those of Erzgebirge, which are partly in *Saxony* and partly in *Bohemia*. One of the oldest deposits of tin known is in the province of Tenasserim, in the *Malacca* peninsula. The best quality of tin is obtained from the island of Sumatra, at the extremity of the *Malacca* peninsula.

DISTRIBUTION OF COPPER.

THE UNITED STATES.—Copper is, next to gold, iron, and lead, the most important metal in the United States. The richest copper mining district in this country is that of Lake Superior. The occurrence of native copper on this lake was known to the Jesuit Fathers, who, in the latter half of the seventeenth century, traveled extensively in that region. The mines were not extensively worked until after the year 1844, when the country was ceded to the United States by the Chippewa Indians, and opened to settlement. Since that time, numerous companies have been organized, and large amounts of stock contributed, for the purpose of opening and working the mines in this region. The principal mines are those of Keweenaw Point, Isle Royale, Ontonagon River, and Portage Lake. The Cliff Mine of Keweenaw Point has been worked for the longest period, and has yielded the greatest amount of metal,—the total product of it, up to the close of 1853, being more than 2,700 tons. This mine has been excavated to the depth of 600 feet.

Copper deposits are found at numerous localities in the valley of the Mississippi,—those in the neighborhood of Mineral Point, Wisconsin, being the most known. They are found also in the region which extends along the eastern slope of the Appalachian chain of mountains from New Hampshire to Georgia. The principal localities in this district occur at, or near, the following places: Warren in *New Hampshire*; Orange in *Vermont*; Bristol, Chester, Litchfield, and Plymouth, in *Connecticut*; Belleville, Griggsville, Brunswick, Woodbridge, Greenbrook, Somerville, and Flemington, in *Jersey*; Montgomery and Chester counties in *Pennsylvania*; Liberia in *New London*, in *Maryland*; Fauquier county in *Virginia*; Greensboro in *North Carolina*; and Polk county in *Tennessee*.

FOREIGN COUNTRIES.—The most noted copper mines of foreign countries are those of Cornwall and Devonshire, in *England*, which have long been famous, and have produced more of this metal than any other country: they are supposed to yield about 14,000 tons annually. In importance to England, as a copper region, is *Chile*, where copper is the most important product. England and

IRON MINES.

There are many iron mines in the world. In the United States, the most important are in the Lake Superior region, in the Adirondacks, and in the Appalachian region. In Europe, the most important are in Sweden, Germany, and France.

The iron mines of the United States are of two kinds: open-pit mines and underground mines. The open-pit mines are found in the Lake Superior region, and the underground mines are found in the Adirondacks and the Appalachian region.

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es the mines of the State of *Missouri*, lying principally south of the *Missouri* River. The principal mines are in Washington county, near Big Bend and Mineral Creek.

FOREIGN COUNTRIES.—Lead mines are distributed through most of countries of Europe, but those of Great Britain and Spain are by far most productive. The most extensive lead mining districts of Great Britain are in Cardiganshire and Montgomeryshire in Wales, and at Alston where the three counties of Northumberland, Durham, and Cumberland come together.

DISTRIBUTION OF IRON.

THE UNITED STATES.—Iron is so very extensively distributed throughout the United States, that only a mere mention of the states in which it is abundant can be given in this article. Rich deposits of this metal are found in almost, if not quite, every State in the Union; but the states in which it is manufactured to the greatest extent are Connecticut, New York, New Jersey, Pennsylvania, Maryland, Virginia, Tennessee, Kentucky, Ohio, and Missouri. Pennsylvania excels all other states in the manufacture of iron, yielding more than half of all that is made in the Union. The number of tons of iron annually made in the United States, according to the census of 1850, was 850,000. Owing to the cheapness of foreign iron, and the extensive importation of it, the iron mines of this country are not worked as largely as they otherwise would be.

IN FOREIGN COUNTRIES.—Great Britain stands pre-eminent for the abundance of its iron and the extent of its manufacture, the annual production of its mines being estimated at about 3,000,000 tons. Of the other foreign countries noted for the production of iron, are France, Belgium, the Austrian Empire, the Russian Empire, Sweden, and Prussia.

NOTE.—For the amount of metals produced throughout the world, see Table on the next page, taken, by permission, from "WHITNEY'S METALLIC WEALTH OF THE UNITED STATES."

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PRINCIPAL MOUNTAINS, WITH THEIR ELEVATIONS.

Names in capital letters apply to an entire range or chain of mountains; the height stated, in such cases, is an approximation to the *average* which its crest attains. The names in small letters, where they merely follow that of a range, are those of some of its principal summits, which the exact height has been ascertained. The figures in all indicate the height above the level of the sea.

Letter (V.) attached to any name, signifies that it is a volcano which has been active within the historical period.

NORTH AMERICA.

Rocky Mountains extend from 34° N. lat. to the shores of the Arctic Ocean, 70° N. lat. From Paso del Norte (about 32° N. lat.) to the South Pass, at 42° N. lat., they have an elevation of from 7,000 to 15,000 feet. From 42° to 47° 30' N. lat., Lewis and Clark's route was from 10,000 to 14,000; and from 47° 30' to 70° N. lat. from 8,000 to 10,000.

MOUNTAINS:	Height in feet.
Mount Brown (lat. 52° 35')	15,690
Mont's Peak	13,570
Griggs' Peak	12,500
Wells' Peak	11,820
Winnish Peaks	11,000
VALLEY OR PLATEAU OF ANAHUAC:	
Teocatepetl (V.)	17,834
Colhuatl	15,705
Peak of Orizaba (V.)	17,878
Parí (V.)	11,929
Sierra de Zacatecas	8,514
OF CENTRAL AMERICA:	
Parícut	7,805
Volcans de Agua	13,578
Popocatepetl (V.)	7,000
Parícut	11,480
OF APPALACHIAN MOUNTAINS:	
Washington, <i>White Mts., N. H.</i>	6,235
Adirondack, <i>Green Mts., Ver.</i>	4,859
Adirondack, <i>Berkshire Mts., Mass.</i>	3,500
Adirondack, <i>or Mt. Marcy, Adirondack Mts., N. Y.</i>	5,487
Adirondack, <i>or Catskill Mts., N. Y.</i>	
Adirondack, <i>or Blue Ridge, Va.</i>	
Adirondack, <i>or Peak Black Mts., N. C.</i>	
OF SNOWY MTS. OF CALIFORNIA, about 10,000 feet.	
Mount Joseph	
Mount Shasta	

[illegible][illegible]

1. 4.0 mph. direction: 70° N. over 50° E. in a mean
2. velocity: 100-120 mph. from 1000; southwest

.....	15.50
.....	19.50
.....	19.50
.....	15.50
.....	21.40
.....	21.15
.....	22.50
.....	22.50
.....	22.50
.....	2.36
.....	16.00
.....	12.154
.....	5.63
.....	18.70
.....	5.7
.....	7.3
.....	5.71
.....	5.73
.....	4.41

EUROPE.

	Height in feet.
KAKAS MOUNTAINS (Turkey) from 2,000 to 3,000 feet:	
Delus	9,000
INDUS (Turkey and Greece):	
unt Gulona	8,239
Elias (<i>ancient</i> Taletan)	7,912
OR EASTERN ALPS (Turkey), from 6,000 to 8,000 feet:	
unt Kom	9,575
unt Dinari	6,667
s (Italy and Switzerland), western part from 8,000 to 9,000 feet:	
oss Glockner (Great Bell)	12,776
ler Spitz	12,818
nte Leone or the Simplon	11,541
nte Rosa	15,152
eat St. Bernard	11,068
ont Blanc	15,760
ont Iseran	18,267
ont Cenis	11,457
onte Viso	12,582
s ALPS (Switzerland):	
nster-sar-horn (Dark Peak of the Air)	14,106
ingfrau (Virgin)	18,710
hreck-horn (Peak of Terrors)	18,887
JURA (France and Switzerland), from 3,000 to 4,000 feet:	
eculet	5,959
s ALPES (Italy), from 4,000 to 5,000 feet:	
onte Cimone	6,973
onte Corno	9,521
esuvius (V.)	8,982
s ALPES (France and Spain), from 7,000 to 9,000 feet:	
alm	10,518
thon, or Maladitta	11,168
erdu	10,991
MOUNTAINS (Spain), from 4,000 to 6,000 feet:	
le Penaranda	10,998
MOUNTAINS (S. Portugal), from 4,000 to 5,000 feet:	
d'Estrella	7,524
OF TOL. 000 to 8,000 feet.	
RENA (S. 000 feet.	
,000 feet:	
.....	11,458
.....	
to 4,000 feet:	
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	Height in feet.
THE VOSGES (France), from 2,000 to 3,000 feet:	
Ballon d'Alsace.....	4,124
HERCYNIAN MOUNTAINS (Germany):	
Brocken (Hartz Mts.).....	3,760
Feldburg (Schwarzwald).....	4,886
Schnee-kopf (Riesin-gebirge).....	5,274
CARPATHIAN MOUNTAINS (Hungary and Transylvania), from 5,000 to 6,000:	
Lomnitz Peak (group of Mount Tatra).....	8,779
Krywan.....	8,150
Mount Petrosch.....	6,884
Mount Szurak.....	7,123
SCANDINAVIAN MOUNTAINS (Norway and Sweden):	
Skaetol-tind (in the Langfeld).....	8,101
Snee-hätten (in the Dovrefeld).....	8,101
Sulltelma (in the Koelen Mountains).....	6,178

ISLANDS OF EUROPE.

BRITISH ISLANDS: Ben Wyvis (Northern Highlands), Scotland.....	3,720
Ben Macdhu (Grampians), Scotland.....	4,805
Ben Nevis " ".....	4,868
Ben Lomond " ".....	3,175
Broadlaw (Mts. of Scotland), ".....	2,741
Scaw Fell (Cumbrian Mts.), England.....	3,166
Snowdon (Cambrian Mts.), Wales.....	3,571
Lugnaquilla (Wicklow Mts.), Ireland.....	3,039
Carn Tual (Mountains of Kerry), ".....	3,404
Paps of Jura (Island of Jura), Hebrides.....	2,470
Ben-more (Island of Mull), ".....	3,163
Cuchullan (Island of Skye), ".....	2,995
Highest point of Hoy Island, Orkney Islands.....	1,590
Mount Rona (Mainland), Shetland Islands.....	1,470
ICELAND: Oraefa Jokull.....	6,409
Hekla (V.).....	5,095
AZORES OR WESTERN ISLANDS: Peak of Pico (V.), Pico I.....	7,911
CORSICA: Monte Rotondo.....	9,063
SARDINIA: Monte Schiuschiu.....	5,276
SICILY: Etna (V.).....	10,617
CANDIA: Psilorati (ancient Ida).....	7,674

A S I A .

ALDAN OR STANOVoi MOUNTAINS (Siberia):	
Mount Kapitan.....	4,263
MOUNTAINS OF KAMTCHATKA, from 10,000 to 15,000 feet:	
Kliuchevsk (V.).....	16,512
ALTAI MOUNTAINS (Siberia and Mongolia), from 5,000 to 7,000 feet:	
Mount Bielukha (lat. 50°, long. 86° 30').....	11,063
BELOOZ-TAGH (Bolor Mts) (Toorkistan and Bokhara), from 15,000 to 20,000	

	Height in feet.
MOUNTAINS (Hindoostan and Tibet), from 15,000 to 28,000 feet.	
Dhaulagiri	28,946
Annapurna	28,156
Everest	29,002
Dhaulagiri (<i>White Mt.</i>)	26,826
Other peaks exceed	20,000
Himalayas (Afghanistan):	
Summit	20,230
Himalayas (Afghanistan):	
Dhaulagiri	17,640
Himalayas (Afghanistan):	
Dhaulagiri	12,150
Himalayas OR CHAIN OF ELBROOZ (Persia):	
Dhaulagiri	14,695
Himalayas (Armenia):	
Dhaulagiri	17,323
Himalayas (Persia and Koordistan), from 6,000 to 9,000 feet:	
Dhaulagiri	10,423
Himalayas (Asia Minor):	
Dhaulagiri (<i>ancient Argæus</i>)	12,869
Dhaulagiri (<i>ancient Olympus</i>)	9,000
Himalayas (India), about 8,000 feet.	
Himalayas (India), from 2,500 to 8,000 feet.	
Himalayas (India), from 8,000 to 4,500 feet:	
Summit about	8,000
Himalayas (India):	
Peak	8,429
Himalayas (India), about 8,000 feet.	
Himalayas (Circassia and Georgia), from 8,000 to 10,000 feet:	
Dhaulagiri	18,493
Dhaulagiri	16,592
Himalayas (between Europe and Asia), from 2,000 to 2,500 feet:	
Dhaulagiri	5,897
Himalayas (Syria), from 6,000 to 7,000 feet:	
Dhaulagiri (<i>ancient Hermon</i>)	11,080
Himalayas (Himalayas):	
Dhaulagiri (Mount	8,598
Dhaulagiri (Mount	7,497
F A S I A .	
Himalayas (on) about	12,000
Himalayas	12,000
Himalayas	4
Himalayas	
Himalayas (Ophir)	
Himalayas (Widow)	
Himalayas (volcanoes)	

APPENDIX.

AFRICA.

Area of Africa (sq. miles) (22,969,535 to 23,000,000)	22,969,535
Area of Africa (sq. miles) (23,000,000 to 23,050,000)	23,000,000
Area of Africa (sq. miles) (23,050,000 to 23,100,000)	23,050,000
Area of Africa (sq. miles) (23,100,000 to 23,150,000)	23,100,000
Area of Africa (sq. miles) (23,150,000 to 23,200,000)	23,150,000
Area of Africa (sq. miles) (23,200,000 to 23,250,000)	23,200,000
Area of Africa (sq. miles) (23,250,000 to 23,300,000)	23,250,000
Area of Africa (sq. miles) (23,300,000 to 23,350,000)	23,300,000
Area of Africa (sq. miles) (23,350,000 to 23,400,000)	23,350,000
Area of Africa (sq. miles) (23,400,000 to 23,450,000)	23,400,000
Area of Africa (sq. miles) (23,450,000 to 23,500,000)	23,450,000
Area of Africa (sq. miles) (23,500,000 to 23,550,000)	23,500,000
Area of Africa (sq. miles) (23,550,000 to 23,600,000)	23,550,000
Area of Africa (sq. miles) (23,600,000 to 23,650,000)	23,600,000
Area of Africa (sq. miles) (23,650,000 to 23,700,000)	23,650,000
Area of Africa (sq. miles) (23,700,000 to 23,750,000)	23,700,000
Area of Africa (sq. miles) (23,750,000 to 23,800,000)	23,750,000
Area of Africa (sq. miles) (23,800,000 to 23,850,000)	23,800,000
Area of Africa (sq. miles) (23,850,000 to 23,900,000)	23,850,000
Area of Africa (sq. miles) (23,900,000 to 23,950,000)	23,900,000
Area of Africa (sq. miles) (23,950,000 to 24,000,000)	23,950,000

STATISTICS OF AFRICA.

Population of Africa (1900)	6,165,000
Population of Africa (1910)	11,946,000
Population of Africa (1920)	17,984,000
Population of Africa (1930)	24,022,000
Population of Africa (1940)	30,060,000
Population of Africa (1950)	36,098,000

ASIA.

Area of Asia (sq. miles) (29,400,000 to 29,450,000)	29,400,000
Area of Asia (sq. miles) (29,450,000 to 29,500,000)	29,450,000
Area of Asia (sq. miles) (29,500,000 to 29,550,000)	29,500,000
Area of Asia (sq. miles) (29,550,000 to 29,600,000)	29,550,000
Area of Asia (sq. miles) (29,600,000 to 29,650,000)	29,600,000
Area of Asia (sq. miles) (29,650,000 to 29,700,000)	29,650,000
Area of Asia (sq. miles) (29,700,000 to 29,750,000)	29,700,000
Area of Asia (sq. miles) (29,750,000 to 29,800,000)	29,750,000
Area of Asia (sq. miles) (29,800,000 to 29,850,000)	29,800,000
Area of Asia (sq. miles) (29,850,000 to 29,900,000)	29,850,000
Area of Asia (sq. miles) (29,900,000 to 29,950,000)	29,900,000
Area of Asia (sq. miles) (29,950,000 to 30,000,000)	29,950,000

APPENDIX.

AFRICA.

Bottoms are V-shape in center with point of Bar. Sec. 1,000 to 4,000 feet

1545

U.S. DEPARTMENT OF AGRICULTURE

Abstract

Figure 1

It is not a good idea to use the same name for the same thing in different contexts. For example, the name "MOUNTAINS OF THE MOON" is used in different contexts, and this can lead to confusion.

3. THE A - 288-170 REPORT

1999

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12-11-1963

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2. Is the company a public company?

SECRET

References

1. NAME OF THE PARTY _____

Figure 1

Also A - 1000 Yards Above, from 5,000 to 5,500 feet:

How Long Is It?

I. ~~_____~~

Peak 1 : Highest peak

REPORT OF SPECIAL AGENT: Mark Dwyer

ISLANDS OF AFRICA.

U.S. DEPT. OF JUSTICE

SECRET

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Page 27

REVENUE AS SEPARATE ADJUSTED EARNING, FROM \$400 to 10,000 Per

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U.S. DEPARTMENT OF AGRICULTURE

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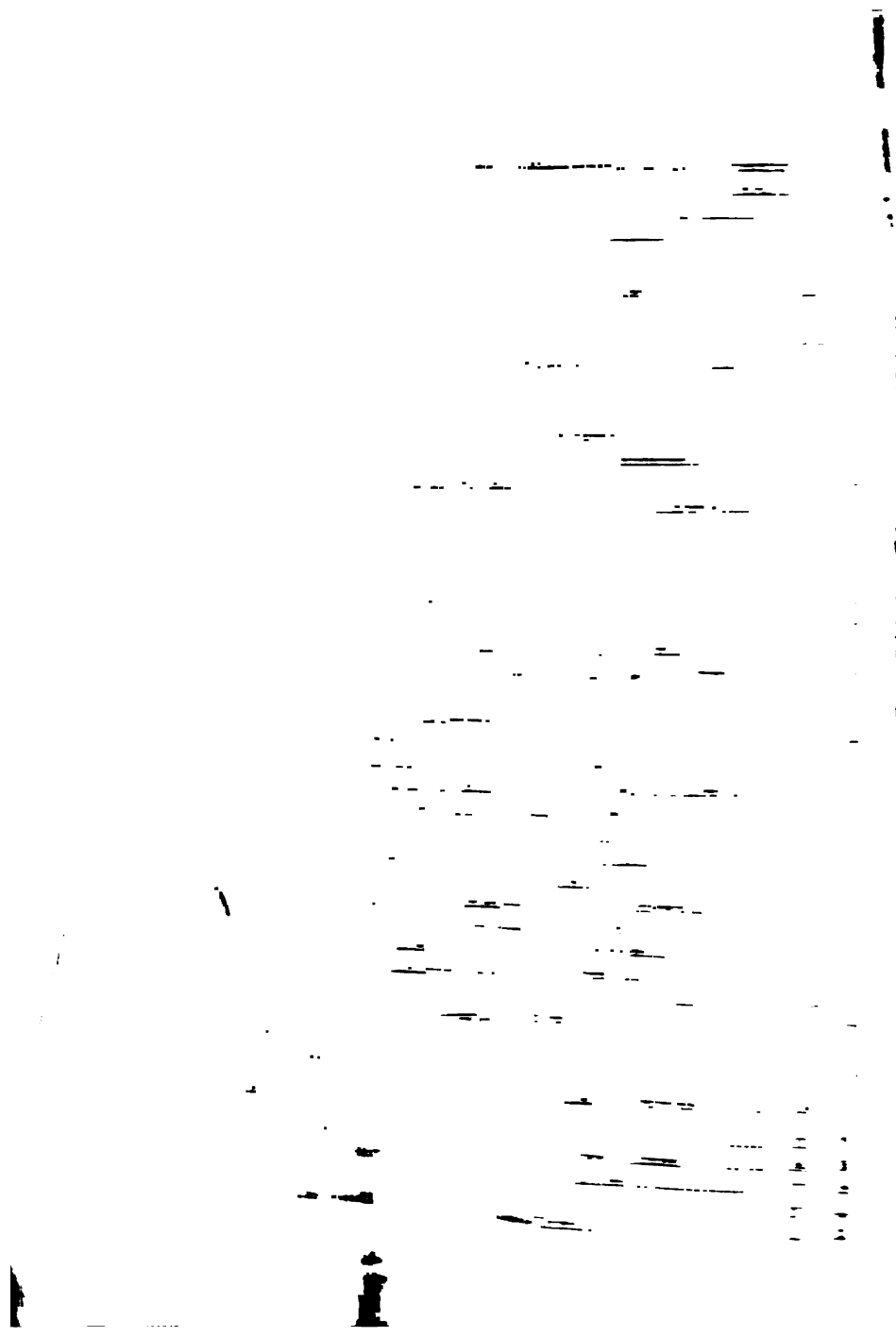
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	Total Length.	Nave Dist.
Lowther Hills),— <i>Scotland</i> : Firth of Clyde	98	35
Mountains of Wicklow),— <i>Ireland</i> : Irish Sea	75	
(Slieve Bloom Mts.), " Waterford Harbor	105	60
" " "	100	36
ON (Mountains of Cavan), " Atlantic Ocean	224	200
(Central Plain),— <i>Ireland</i> : Irish Sea	80	19

ASIA.

Altai Mountains),— <i>Siberia</i> : Arctic Ocean	2,580	900
SEI " " "	2,900	540
" " " "	2,400	800
DE (Mongolia),— <i>Mongolia, Manchooia</i> : Gulf of Tartary	2,800	
NG-HO (Kuenlun Mountains),— <i>China</i> : Yellow Sea	2,600	500
G-TSE-KIANG " " "	3,200	700
O-KIANG (Nan-ling Mountains),— <i>China</i> : China Sea	1,100	370
E-KIANG (Tibet),— <i>Tibet, China, Cambodia</i> : "	1,300	500
INAM (Mts. of Yunnan),— <i>China, Laos, Siam</i> : Gulf of Siam	900	
LUEN (Plateau of Tibet),— <i>Tibet, China, etc.</i> : Gulf of Martaban	1,700	
AWADY " — <i>Birmah</i> : Bay of Bengal	1,100	600
AMAHPOOTRA " — <i>Assam, Hindoostan</i> : Bay of Bengal	1,500	650
ANGES (Himalaya Mountains),— <i>India</i> : Bay of Bengal	1,460	900
ODAVEERY (The Ghauts),— <i>Hindoostan</i> : Indian Ocean	700	60
ESTNAH " " "	650	
LAUVERY " " "	470	
INDUS (Plateau of Tibet),— <i>India</i> : Arabian Sea	1,700	942
EUPHRATES (Plat. of Armenia),— <i>Turkey in Asia</i> : Persian Gulf	1,700	1,000
TIGRIS " " Euphrates River	1,150	320
KUR " — <i>Georgia</i> : Caspian Sea	520	
JORDAN (Mountains of Lebanon),— <i>Palestine</i> : Dead Sea	287	
URAL, or Iaik (Ural Mts.),— <i>between Europe and Asia</i> : Caspian Sea	1,150	
or Jihon (Plateau of Pamir),— <i>Toorkistan</i> : Sea of Aral	1,300	

AFRICA.

ean Central Africa),— <i>Donga, Nubia, Egypt</i> : Mediterranean Sea	3,600	
Mts. of Western Soudan),— <i>Senegambia</i> : Atlantic Ocean	900	400
" " " "	650	800
Niger (Mts. of Kong),— <i>Soudan</i> : Gulf of Guinea	2,500	700
ngo (Plateau Central Africa),— <i>Congo</i> : Atlantic Ocean	1,200	
" — <i>Angola</i> : "	500	
ange (Nieuvelde Mts.),— <i>S. Africa</i> : "	1,050	
rior of Africa),— <i>East Africa</i> : Indian Ocean	1,600	

OCEANICA.

ragong Mountains),— <i>Australia</i> : Indian Ocean	1,
Darling Range), " "	
St. Clair),— <i>Tasmania</i> : Pacific Ocean	
Zealand: Pacific Ocean.	

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COLTON AND FITCH'S MODERN SCHOOL GEOGRAPHY.

This book, in quarto form, is designed for that very large class of persons in our schools who wish to learn the more important facts of geography, but have not time to consult thoroughly the most elaborate treatises. The aim of the Author has been to present in this work such facts, and only, as every scholar should understand before he completes his term instruction. Accordingly, all tedious detail and extended description is omitted; and the learner's attention is confined principally to the facts, from which only can correct and definite impressions of locality be obtained.

The Publishers would call the particular attention of Teachers and others to the Maps which illustrate this book. Every intelligent instructor must have noticed that the maps generally put into the geographies prepared for Common Schools are extremely meagre and imperfect; many countries are not represented at all, and those which are exhibited are delineated on so small a scale, and are so carelessly drawn, that the impressions they convey are of scarcely any value.

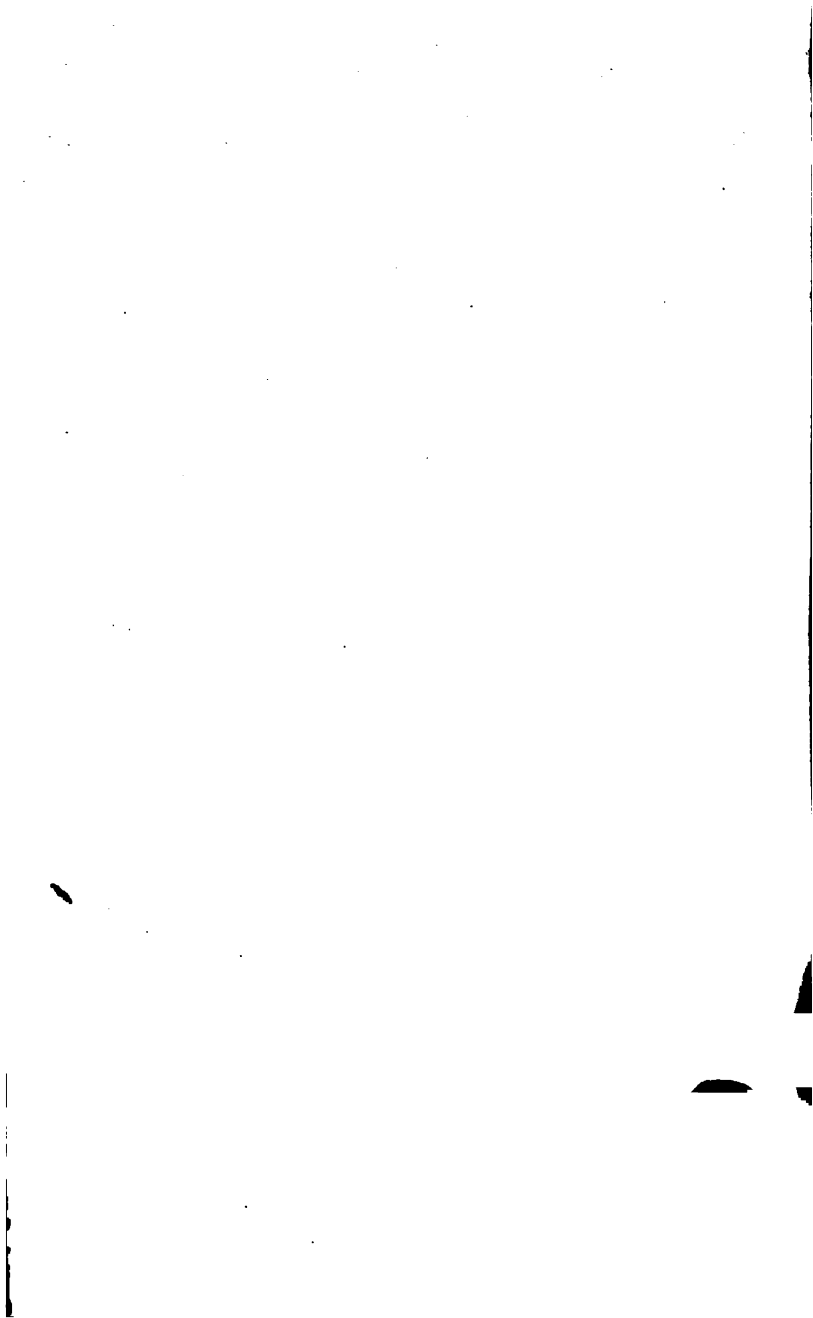
The greatest possible pains have been taken with the compilation, drawing and engraving of these Maps, to make them full, clear, and reliable; they will possess the additional merit, not found in any other similar published in this country, of showing contiguous states and countries on the same scale. This is an important desideratum, and has been entirely disregarded in the preparation of School Geographies, the result being that no correct ideas of relative size and dimension are formed, and other desirable improvements are introduced, and the Publishers trust that the Map illustrations far excel those of any similar

work as complete as the limits and design of the work will allow. The largest number of pupils in our Common Schools will find in it an acquiring a good knowledge of geography.









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